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Royal Philips Electronics

DVD-Video Verifier

RELEASE 1.5.0 / 4.6.0

(based on DVD spec. v1.12 + Supplemental Informations)

User Manual

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1. Introduction

The DVD-Video Verifier is a verification tool developed by Royal Philips Electronics to support the generation of DVD-Video discs, compliant with both MPEG-2 and DVD standards. The verifier performs syntax checks as well as semantic and dynamic checks. The tool generates a report with all detected violations of the standards. Additionally, the input stream can be analysed and its contents on all specified levels can be logged in a clear and concise way.

1.1 Purpose

This manual explains how to use the DVD-Video Verifier and in particular describes the graphical user interface. Furthermore, an overview of all verifier checks is given and some guidance on how to interpret error messages.

1.2 Scope

This document relates to the Windows version 1.5.0/4.6.0 of the DVD Verifier. The version number reflects both the version of the DVD specific part (v1.5.0) and the version of the underlying MPEG-verification core (v4.6.0).

1.3 Acronyms and Abbreviations

A/V	Audio/Video
AC3	Dolby AC3
AU	Access Unit
AVDP	Anchor Volume Descriptor Pointer (UDF)
BTNI	Button Information
CGMS	Copyright General Management System
CRC	Cyclic Redundancy Check
CSS	Copy Security System
DCCMD	Display Control Command (Sub-picture)
DCSQ	Display Control Sequence (Sub-picture)
DCT	
DDP	Disc image format according to Doug & Parson
DSI	Data Search Information
DTS	Decoding Time Stamp
DVD	Digital Versatile Disc
ECMA	European Computer Manufacturers Association
EDC	Error Detection Code
ES	Elementary Stream
ESTD	Elementary Stream System Target Decoder
FID	File Identifier Descriptor
GEM	General Event Manager (verifier module)
GPRM	General Parameter
GOF	Group Of Frames
GOP	Group Of Pictures
HLI	Highlight Information
ICB	Information Control Block
ILVB	InterLeaved Block
ILVU	InterLeaved Unit
LFE	Low Frequency Emission (subwoofer channel)

LPCM	Linear PCM
LVD	Logical Volume Descriptor
LVID	Logical Volume Integrity Descriptor
LVIS	Logical Volume Integrity Sequence
MP@ML	Main Profile / Main Level
MPEG	Moving Pictures Expert group
NCMD	Navigation Commands
PCI	Presentation Control Information
PGCI	Program Chain Information
PES	Packetised Elementary Stream
PKT	Packet
PREU	Pre-interleaved Unit
PRS	Program Stream
PS	Program Stream
PTM	Presentation Time
PTT	Part of Title
PTS	Presentation Time Stamp
PU	Presentation Unit
PVD	Primary Volume Descriptor
PSTB	
P-STD	Program stream System Target Decoder
PXD	Pixel Data
RMA	Region Management
RBN	Relative Block Number (hexadecimal)
RLBN	Relative Logical Block Number (decimal)
SCR	System Clock Reference
SEC	Sector
SEQ	Sequence (Elementary Stream)
SPU	Sub Picture Unit
SPUL	Sub Picture Unit Length
SRSV	
SSRC	
STD	System Target Decoder
SVD	Supplementary Volume Descriptor
TMAP	Time Map
TMU	Time Unit (part of VTS TMAP entry)
TTU	Title Unit
UDF	Universal Disk Format (File System)
USD	
VBV	Video Buffer Verifier
VMG	Video Manager
VMGI	Video Manager Information
VLC	
VOB	Video Object
VOBS	Video Object Set
VRA	Volume Recognition Area
VTS	Video Title Set
VTSI	Video Title Set Information
msb	most significant bit



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1.4 References

<u>ID in this document</u>	<u>Document identification information</u>
[II 13818-1]	ISO/IEC JTC 1/SC 29/WG 11, ISO/IEC 13818-1: Information Technology - Generic Coding of Moving Pictures and Associated Audio: Systems, 1 st edition 1996/4/15.
[II 13818-2]	ISO/IEC JTC 1/SC 29/WG 11, ISO/IEC 13818-2: Information Technology - Generic Coding of Moving Pictures and Associated Audio: Video, 1995.
[II 13818-3]	ISO/IEC JTC 1/SC 29/WG 11, ISO/IEC 13818-3: Information Technology - Generic Coding of Moving Pictures and Associated Audio: Audio, 2 nd edition 1997/2/20.
[II 13818-4]	ISO/IEC JTC 1/SC 29/WG 11, ISO/IEC 13818-4: Information Technology - Generic Coding of Moving Pictures and Associated Audio: Conformance, 1995.
[II 11172-1]	ISO/IEC JTC 1/SC 29/WG 11, ISO/IEC 11172-1: Information Technology - Generic Coding of Moving Pictures and Associated Audio: Systems, 1995.
[II 11172-2]	ISO/IEC JTC 1/SC 29/WG 11, ISO/IEC 11172-2: Information Technology - Generic Coding of Moving Pictures and Associated Audio: Video, 1995.
[II 11173-3]	ISO/IEC JTC 1/SC 29/WG 11, ISO/IEC 11172-3: Information Technology - Generic Coding of Moving Pictures and Associated Audio: Audio, 1995.
[DVD-1]	DVD Specifications for Read-Only Disc, Part 1, Physical Specifications, Version 1.1, December 1997
[DVD-2]	DVD Specifications for Read-Only Disc, Part 2, File System Specifications, Version 1.1, December 1997
[DVD-3]	DVD Specifications for Read-Only Disc, Part 3, Video Specifications, Version 1.1, December 1997
[DVD-S]	DVD Specifications for Read-Only Disc, Supplemental Information, December 1997

2. Verifier Use

2.1 Features

This version of the DVD-Video Verifier supports the following features.

On MPEG level:

- Complete parsing of program streams,
- Verification of program streams, with checks on:
 - packs
 - system_headers
 - PES_packets
 - PES_packet data
 - SCR timing
 - P-STD buffer model
- MPEG-1 & MPEG-2 MP@ML:
 - sequence_headers
 - gop_headers
 - pictures
 - slices
 - macroblocks
 - blocks
 - video VBV or Leak Method buffer model
- Complete parsing of MPEG video and MPEG audio layer I & II, incl. multichannel audio
- Verification with checks on:
 - audio frames
 - audio frame headers
 - audio frame data

On DVD level:

- Parsing of:
 - UDF and ISO 9660 filesystem
 - sector_headers
 - VMGI
 - VTSI
 - PGCI
 - private_stream_1 data
 - private_stream_2 data
 - SPU
 - PCI
 - DSI
 - Navigation Commands
 - LPCM
 - AC3 [Not enabled in this version !]



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- Verification with checks on:
 - UDF and ISO 9660 filesystem
 - sector_headers
 - VMGI
 - VTSI
 - PGCI
 - SPU
 - PCI
 - DSI
 - Navigation Commands
 - Crosschecks between VMGI, VTSI, PGCI and VOBs
 - LPCM
 - Extended STD-buffer verification
 - ILVU & seamless jumps
 - AC3
 - Verification of non-seamless jumps

2.2 Graphical User Interface

2.2.1 Generic Information

2.2.1.1 Capabilities and Limitations

The DVD-Video verifier allows for complete parsing of DVD and MPEG data. The verifier further allows for verification of all MPEG and DVD constraints of a DVD-disc either directly from disc, from a DDP disc image (copied to the hard disk of the verification system) or available as a (possibly incomplete) file set (both directly from DVD-disc or from the system's hard disk), with the following limitations:

- Files with DVD compliant file naming conventions are supported and will be verified according the DVD spec. These include: VIDEO_TS.IFO, VIDEO_TS.BUP, VIDEO_TS.VOB, VTS_<01..99>_0.IFO, VTS_<01..99>_0.BUP, VTS_<01..99>_<0..9>.VOB. These filenames may be preceded by any combination of characters.
- When verification of a disc is requested, only standard DVD files normally present on a DVD-disc are supported, i.e. IFO & their backup (.BUP) or VOBS files. Files in other directories than the /VIDEO_TS/ directory are not supported.
- MPEG Program streams are supported, but must use a filename that contains no .VOB, .IFO, 0_, or .BUP, otherwise they might be confused for DVD specific files (in fact, all filenames that do not fall in the above categories are seen as MPEG Program Stream).
- Files other than DVD specific files, like MPEG PES, MPEG Video or Audio ES, MPEG private_stream_1 or private_stream_2 or DVD specific private data streams such as SPU or PCI are NOT supported. When selected, files of this type will be verified as a Program Stream.
- Only DDP disc images with the “0_”-prefix or “1_”-prefix file naming convention are supported. The “1_”-prefix part of the disc image cannot be verified separately from the “0_”-prefix.
- A CSS encrypted disc cannot be fully verified. Because only VOB files may be CSS encrypted, it is still possible to verify all other content of the DVD-Video disc.

2.2.1.2 Command line options

The DVD GUI can be used in the normal way, i.e. by clicking on the icon and user interaction. However, in order to facilitate automated verifier runs, the DVD GUI can also be started with a command line option (e.g. from a batch file), in which case the verification will automatically start and will not need any additional user input. For more details about command-line runs, see section 2.2.6 on page number 27.

2.2.1.3 Output

All output is written to ASCII log files. Optionally, output can also simultaneously be sent to a window for real-time viewing during the verification process.

The program generates one log file per file that has been verified with the contents dump and verification report, in the same directory as the input file unless an output directory has been specified as part of the log file name or explicitly via the GUI. Note that when verifying directly from a read-only device, the output directory is mandatory. Additionally, if selected, for each VOB file a STD buffer data file (i.e. to be visualised with GNUPLOT or Microsoft Excel) can be generated per PES (stream_id). At present, these are created with the default file names (see Chapter 2.2.4.1.8. The ‘Log STD buffer model’ checkbox) in the



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same directory as the input file unless an output directory has been specified explicitly via the GUI or as part of the log file name.

2.2.2 The ‘Main’ window

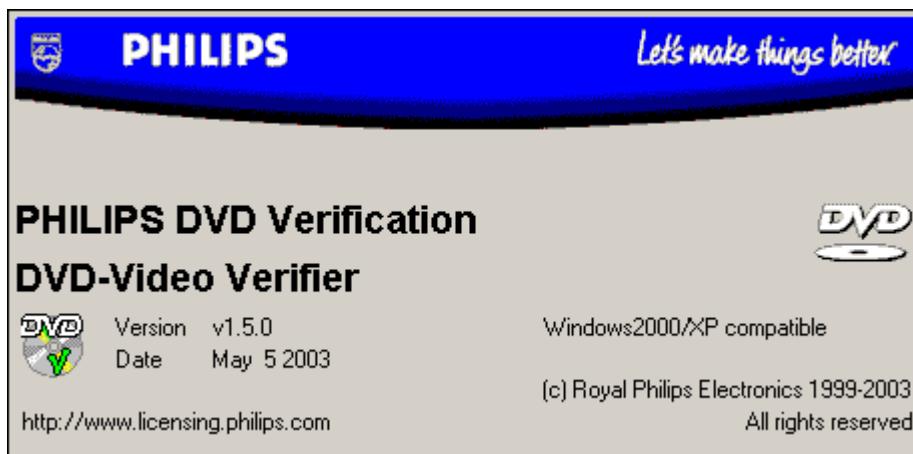


Figure 1: Splash window

After the initial ‘Splash’ window (cf. above) has been displayed for a short time, the main window is presented:

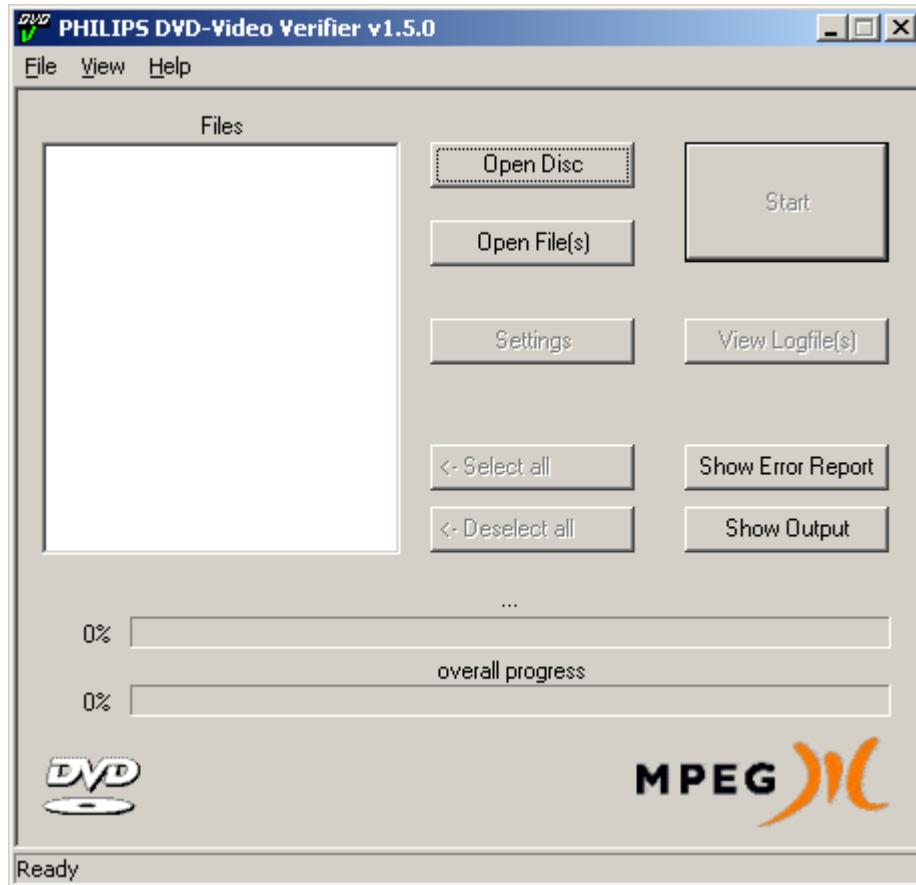


Figure 2: Main DVD verifier window

The ‘Start’-button and the ‘Settings’-button will be disabled at the start of the application, until a disc, disc image or file is loaded (via ‘Open Disc’-button or ‘Open File(s)’ button).

2.2.2.1 The ‘Open Disc Image’ button

When clicked, a dialog is presented allowing the selection of the DVD-ROM drive containing the DVD-Video disc to verify:

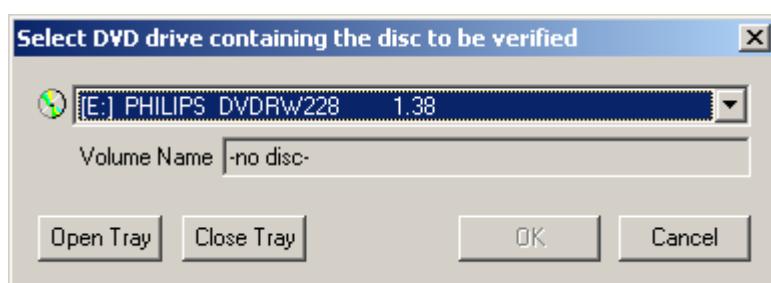


Figure 3 : Select DVD drive window



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It is possible some discs are not ‘seen’ by certain older DVD-ROM devices.

Especially DVD+RW discs (with e.g. DVD-Video) content less than 1 GB of data are sometimes not recognized. You could try a newer DVD device (or maybe better to use a DVD burner device).

Select the DVD device, which contains the DVD to be verified. The program then scans the disc to detect all DVD compliant files it contains. These are then listed in the main window file list box and are transcribed to reflect their contents (cf. window below).



Figure 4 : The updated main window

When scanning of the Disc takes a long time, a window is shown temporarily, to indicate that the verifier is busy:



Figure 5 : Please wait...

When a wrong disc, corrupt disc or no disc is inserted the following message box is presented.



Figure 6 : Error: Cannot read disc

Files belonging to a Title VOBS are represented in a special way: VTS_\$\$_#.: .@.VOB (in the above window, the VTS_01_1.: .6.VOB is such a file), where \$\$ equals the VTS number, # equals the first VOB file (normally '1') and @ equals the last VOBS file. When this entry is selected, all files belonging to the VOBS will be verified.

2.2.2.2 The ‘Open Disc Image’ button

When clicked, a standard Windows file window is presented allowing to select the location of the files to be verified. The ‘Files of type’ listbox allows the user to select which files should be showed in the filelistbox. To change the selected file type, click on the arrow button and select a file type from the dropdown listbox :

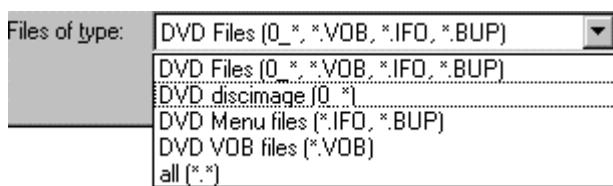


Figure 7 : Files of type

- ‘DVD Files’ includes all DVD specific files, which are supported. ‘0_ *’ for disc images, ‘*.VOB’ for VOBS files, ‘*.IFO’ for Menu files and ‘*.BUP’ for Backup files of the Menu files.
- ‘DVD discimage’ includes only the disc image files conforming to the ‘0_*’-prefix or ‘1_*’-prefix naming convention. For verification, only the ‘0_*’-file must be selected, the corresponding ‘1_*’-file will be verified automatically.



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- ‘DVD Menu files’ includes only the DVD Menu files, ‘*.IFO’ for Menu files and ‘*.BUP’ for Backup files of the Menu files.
- ‘DVD VOB files’ includes only the DVD VOBS files.
- ‘All’ includes all files.

The filelistbox above then lists all candidates found in the currently selected directory.

Select the disc image or the DVD files (multiple files can be selected in the normal Windows way, using CTRL or SHIFT), which could be included in a verifier run.

When a disc image is selected, the program scans it to detect all files it contains. These are then listed in the main window ‘Files’ listbox, transcribed to reflect their contents (cf. Figure 4 : The updated main window).

When scanning of the disc image takes a long time, a window is shown temporarily, to indicate that the verifier is busy (cf. Figure 5 : Please wait...)

When a file was selected with a filename that looks like a disc image (0_*, 1_*), and while scanning this file it was determined that this file does not appear to be a disc image file, the file will also be added to the file list ‘as is’ and it will be verified as an MPEG PS.

Files belonging to a VOBS are represented in a special way: VTS_\$\$#..@.VOB, where \$\$ equals the VTS number, # equals the first VOBS file (normally ‘1’) and @ equals the last VOBS file. When this entry is selected, all files belonging to the VOBS will be verified.

Likewise, when a set of DVD files has been selected, these are also copied to the parent window file list window and transcribed. When a disc image was selected together with other files, the other selected files will be omitted and only the disc image (0_*) will be scanned.

2.2.2.3 The ‘Files’ listbox

Lists all files that can be verified.

Select the filename(s) to enable their verification.

2.2.2.4 The ‘Select All’ button

Selects all possible candidates for verification.

2.2.2.5 The ‘Deselect All’ button

Deselects all files for verification.

2.2.2.6 The ‘Start’ button

Starts verification of all selected files with the chosen options. When no files were selected, a requester will inform the user of this problem. If the settings were not set before the verification was started, default settings will be used.

When clicked, the caption on the button will change to 'Stop', and numerous buttons on the main window will be disabled in order to prevent the user from clicking them. The 'Stop' button can be used to abort the verification. When clicked, the following requester appears:



Figure 8 : Quit requester

Verification will continue even while this requester is displayed, until the user selects the 'Yes' button.



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2.2.2.7 The 'View Log Files' window

When the verifier has verified all files, the following log file viewer window is shown. In the left side of the screen a list with all log files created by the verifier is presented. On the right side of the window the selected log file can be viewed.

This log viewer can deal with large files, it has advanced search functions, it is possible to print (a part of) a log file and copy selected piece of text to the clipboard.

The screenshot shows a Windows application window titled "D:\DVD\Test\disc.log - Lumberjack". The menu bar includes File, Edit, View, and Help. Below the menu is a toolbar with icons for Find and Print, and dropdown menus for Error, Previous, and Next. The main area displays the contents of the log file "disc.log". The log file starts with copyright information for DVD-Video Verifier version 1.5.0/4.6.0 from April 11, 2003, released by Maurice Hebben from Philips Digital Systems Lab. It then lists various processing steps: Bitstream input file, Scrambled data skipped, DVD stream input type set to Disc(image), Decoding skipped for MPEG levels, and Dump enabled for MPEG levels. It also lists File System Directory, Video Manager Info, Video Title Set Info, and Program Chain Info. A warning message at the bottom indicates an [UDF] ERROR 5155 due to a missing NSR02 descriptor at sector/block 18, byte 0 bit 0.

```
*****  
* DVD-Video Verifier, Version 1.5.0/4.6.0  
* d.d. April 11, 2003  
*  
* Released for exclusive use by  
* Maurice Hebben  
* Philips Digital Systems Lab  
*  
* Copyright (c) 2003, Royal Philips Electronics N.V.  
* All rights reserved.  
*****  
  
*****  
* Bitstream input file =  
*  
* Scrambled data is skipped !  
*  
* DVD stream input type = Disc(image)  
*  
* Decoding skipped for MPEG levels :  
* TRS stream  
* Macroblock  
* Dolby AC-3 audio  
*  
* Dump enabled for MPEG levels :  
* DVD levels :  
* File System Directory  
* Video Manager Info  
* Video Title Set Info  
* Program Chain Info  
*  
*****  
>>> [UDF] ERROR 5155 (ref. ECMA 3/3.1) :  
The NSR02 descriptor is not recorded  
at sector/block 18, byte 0 bit 0
```

Figure 9 : View Log Files window

2.2.2.8 The ‘Show Error Report’ button

When clicked, this button enables the window that displays, for each message number that has been reported since the ‘Start’ button was clicked, the number of times the message was reported and the type of the message. The caption of the button changes to ‘Hide Error Report’, which when clicked, closes the error report window. Notice that the error report window can only be closed by clicking the ‘Hide Error Report’ button on the main window.

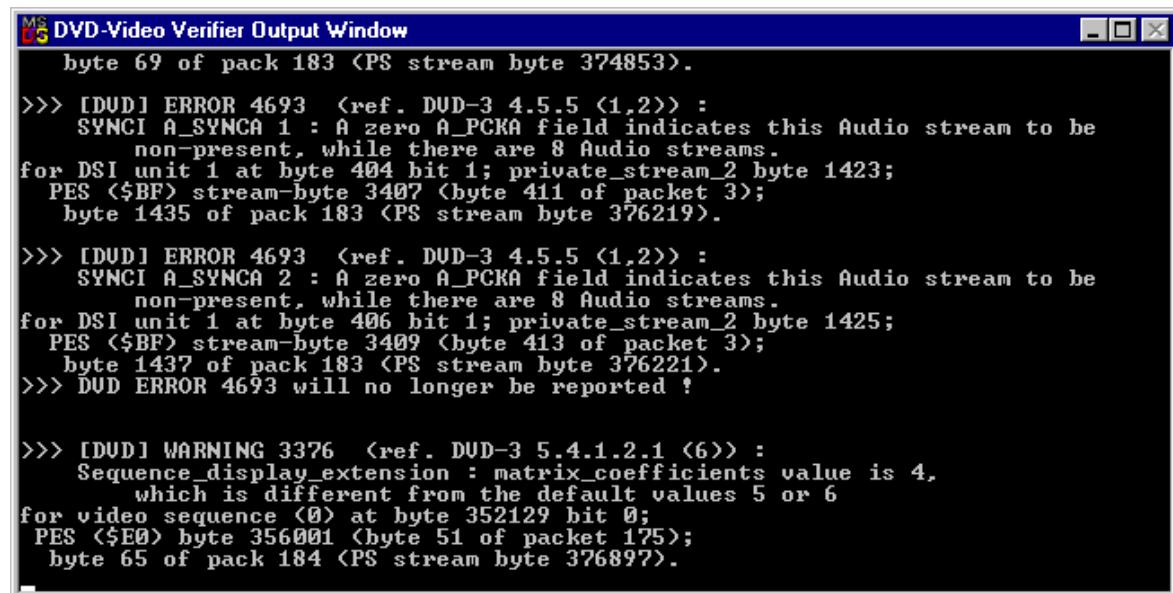
Reported errors		
ERROR	5213	5
INFORMATION	3011	1
INFORMATION	3124	134
INFORMATION	4005	1
INFORMATION	4071	1
INFORMATION	4408	2
INFORMATION	5970	5
ODDITY	1635	1
WARNING	3376	4

Figure 10 : Reported errors window



2.2.2.9 The ‘Show Output’ button

When clicked, this button enables the real-time output window, so the output can be viewed. The caption of the button changes to ‘Hide Output’, which when clicked, closes the output window. Notice: clicking the ‘Hide Output’ button can only close the output window. The Output window can be opened only during the ongoing verification process.



The screenshot shows a standard Windows-style console window titled 'DVD-Video Verifier Output Window'. The window contains several lines of text representing log messages from the verification process. The messages include errors (e.g., [DUD] ERROR 4693) and warnings (e.g., [DUD] WARNING 3376), along with some descriptive text about audio streams and sequence display extensions.

```

MS-DOS DVD-Video Verifier Output Window
byte 69 of pack 183 <PS stream byte 374853>.

>>> [DUD] ERROR 4693 <ref. DUD-3 4.5.5 <1,2>> :
    SYNC1 A_SYNCA 1 : A zero A_PCKA field indicates this Audio stream to be
    non-present, while there are 8 Audio streams.
for DSI unit 1 at byte 404 bit 1; private_stream_2 byte 1423;
PES <$BF> stream-byte 3407 <byte 411 of packet 3>;
    byte 1435 of pack 183 <PS stream byte 376219>.

>>> [DUD] ERROR 4693 <ref. DUD-3 4.5.5 <1,2>> :
    SYNC1 A_SYNCA 2 : A zero A_PCKA field indicates this Audio stream to be
    non-present, while there are 8 Audio streams.
for DSI unit 1 at byte 406 bit 1; private_stream_2 byte 1425;
PES <$BF> stream-byte 3409 <byte 413 of packet 3>;
    byte 1437 of pack 183 <PS stream byte 376221>.
>>> DUD ERROR 4693 will no longer be reported !

>>> [DUD] WARNING 3376 <ref. DUD-3 5.4.1.2.1 <6>> :
    Sequence_display_extension : matrix_coefficients value is 4,
        which is different from the default values 5 or 6
for video sequence <0> at byte 352129 bit 0;
PES <$E0> byte 356001 <byte 51 of packet 175>;
    byte 65 of pack 184 <PS stream byte 376897>.

```

Figure 11: The output window

The window is a standard console window and can be customized accordingly. In order to change the properties: right-click in the title bar when the window is shown, and select ‘Properties...’ from the menu. The properties-window will appear, cf. below.

One setting is very important; because it regulates the amount of data that the window can hold, click the ‘Layout’ tab:

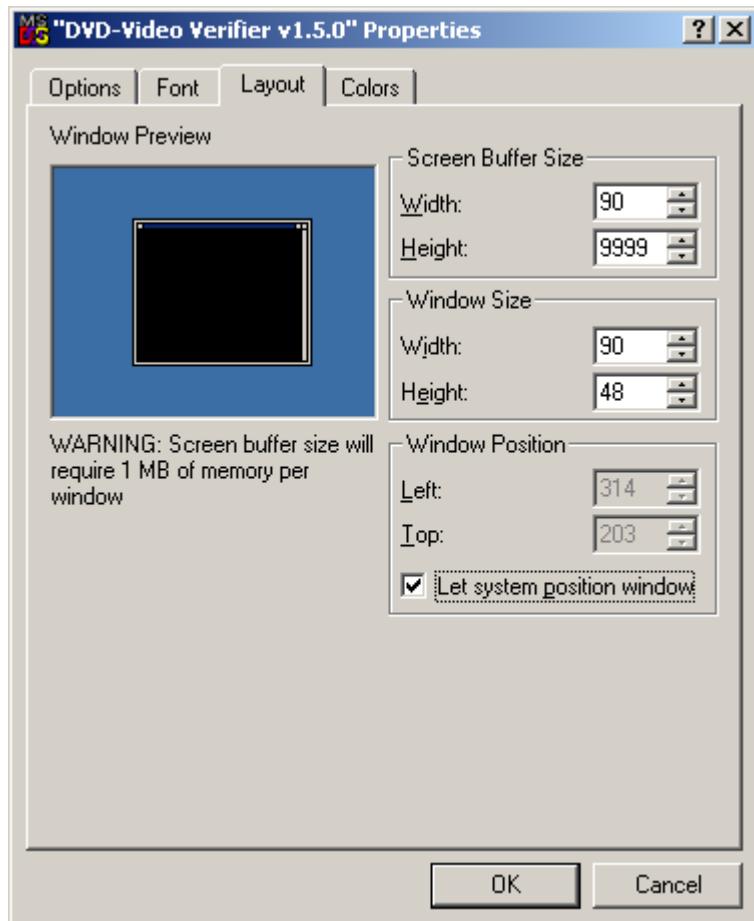


Figure 12: The output window's layout properties page

If you want to buffer more than the standard 25 lines of data, enter a large number into the 'Height' field for the 'Screen Buffer Size'. Set the rest of the settings the way you like it and click the 'OK' button. The following requester appears:



Figure 13: Save properties for windows with the same title

Select the 'Modify shortcut that started this window' radio-button and click on the 'OK' button, cf. above.



2.2.2.10 The ‘Progress bars’

At the bottom of the main window are the progress bars. The top progress bar shows the progress of the file currently being verified. The caption above this progress bar indicates the filename of the file ('...' when the program is idle), which is currently being verified.

The bottom progress bar shows the progress of the verification of all selected files. When the bottom progress bar reaches 100%, verification will be finished.

2.2.2.11 The ‘Status Bar’

The Status Bar is located in the lower left corner of the window:

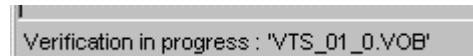
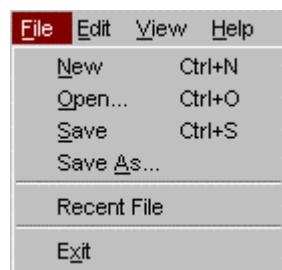


Figure 14: The status bar

The Status Bar is used to display what the DVD verifier is doing.

2.2.3 The ‘menu’

2.2.3.1 The File menu



- | | |
|-------------|---|
| New | Does not work yet. |
| Open... | Open a Settings file. A standard windows file requester window appears, which can be used to select the settings file to be read. |
| Save | Saves the current settings to the filename displayed in the title bar of the main window. If no filename was previously selected, a standard Windows file requester will allow the user to select the filename. |
| Save As... | Saves the current settings to a selectable filename. A standard Windows file requester will allow the user to select the filename. |
| Recent File | Does not work yet. |
| Exit | Exits the program (or click on the button in the right top corner of the window). |

2.2.3.2 The Edit menu



This menu has no function, so it always appears ghosted.

2.2.3.3 The View menu



- | | |
|------------|--------------------------------|
| Toolbar | Toggles the Toolbar. |
| Status Bar | Toggles the Status Bar. |
| Settings | Shows the settings dialog box. |

2.2.3.4 The Help menu



- | | |
|------------------|--|
| About DVD_GUI... | Shows version information about the DVD verification tool. |
|------------------|--|



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2.2.4 The ‘Settings’ window

The settings window will be shown, when the Settings button is clicked, or the Settings from the View menu is selected. The Settings window is divided into 6 tab windows. These tab windows group settings for easy reference. Initially, the Misc settings tab will be shown.

2.2.4.1 The ‘Misc settings’ tab

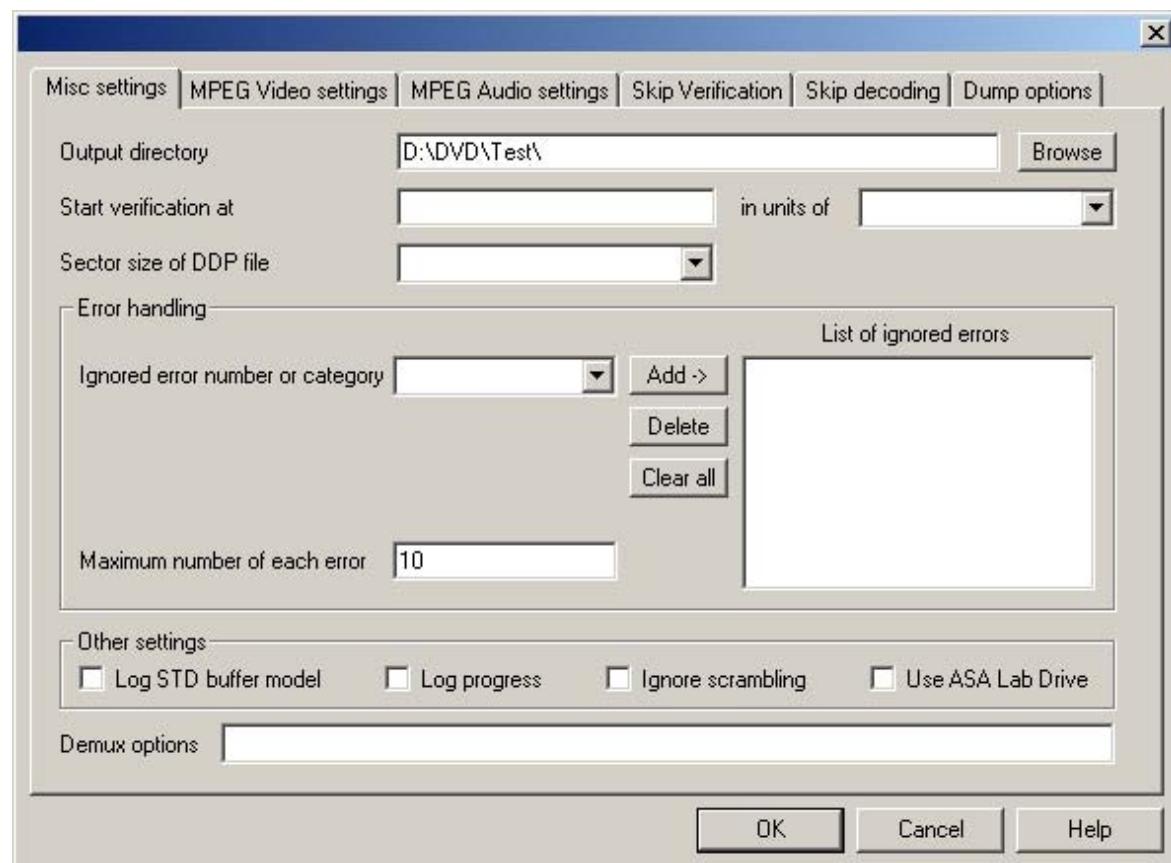


Figure 15: The miscellaneous settings window

If any files were selected before the settings window was activated, the settings of only those files will be affected. When no file was selected, the settings will be stored as default settings for all files.

2.2.4.1.1 The ‘Output Directory’ editbox

This option is used to specify the output directory of all generated files, contents dump, verification report log files and STD buffer log files. If no output directory is specified, the files are written to the same directory as where the input files reside. However it is obviously not allowed when verifying directly from DVD disc, or when the input files reside in a read-only directory, in which case one has to specify some directory with write access. The user can directly type the output directory in the editbox, or can click the **Browse** button, which will present a standard Windows directory requester.

Note: The output directory must not contain spaces. The verifier’s internal parser cannot deal with spaces.

When the ‘Start’ button on the main windows is clicked, the program checks if the selected output directory is writable and informs the user with a requester if this is not the case.

2.2.4.1.2 The ‘Maximum number of each error’ editbox

Specifies the maximum number of times that one specific error message should be logged. Normally, the maximum number is set to 20.

2.2.4.1.3 The ‘Start verification at’ editbox

This option allows starting the file parsing & verification not immediately from the start of the file but only from a specified location onwards, in an attempt to speed up the, in some cases lengthy, VOBS verification. Specify in this field the access unit number (pack or packet) or the stream Byte position to start the verification at.

➔ **Beware:** This option should be used with extreme care! Since this may cause some required or invaluable data to be skipped and thus missing for the verification process, this may at least result in some unexpected (and unjustified error messages) and on some occasions even result in a program crash!

2.2.4.1.4 The ‘in units of’ dropdown listbox

This specifies the units used by the number above. This can be:

- “Pack” in case of a VOB file (which is in fact an MPEG Program Stream).
- “Packet” in case of PES (Packetized Elementary Stream) input.
- “Byte” in case of ES (Elementary Stream) input.

2.2.4.1.5 The ‘Sector size of DDP file’ dropdown listbox

In case of a DDP disc image input without matching ID file, the verifier tries to determine the sector size used by the image (since several variants exist). If this does not succeed, e.g. when there are several possibilities, the verifier reports this and the user is requested to specify the correct sector size through this field. The user can select a value from the dropdown listbox.

2.2.4.1.6 The ‘Error number or category’ editbox

The user can either force the verifier to ignore all messages of a certain class (informations, errors, syntax errors, system errors, warnings, oddities, and recommendation violations) or ignore a specific error by typing its error number. Click the **Add ->** button to transfer the selected error class or error number to the ‘List of ignored errors’ listbox.

2.2.4.1.7 The ‘List of ignored errors’ listbox



This listbox lists all currently selected errors to be ignored during the verification process. To remove an error class or error number from this listbox, select the entry and click the **Delete** button. To remove all entries from this listbox, click the **Clear all** button.

2.2.4.1.8 The ‘Log STD buffer model’ checkbox

When checked, the program creates an ASCII file for every PES (characterized by a specific stream_id) in a VOBS file, containing the STD buffer model data. The STD buffer log files use the following naming convention:

File type	File name
PES streams	<filename>.std_<stream_id>
Private streams	<filename>.std_s<sub_stream_id>

These files can be fed to the public domain tool “Gnuplot”, or can be imported into Microsoft Excel, to generate a graphical representation of the P-STD buffer contents of that particular PES for the complete stream.

To import one of these files into Microsoft Excel, select ‘File->open’ from the menu. Select the filename of the STD buffer you want to load. The text import wizard will pop up, in which you can use all the default options. You can then insert a chart, which uses the A1 column as the X-axis and the B1 column as the Y-axis. Use the menu ‘Insert->Chart’ and chose the ‘XY scatter’ or ‘Line’ type. For some reason the data range is limited to 32000 samples per series.

2.2.4.1.9 The ‘Log progress’ checkbox

This option, when checked, adds a line to the output log file every 100 packs or packets, to give an idea of the verification process progress. For reading the log file, it is sometimes nice to see where a particular error occurred in the stream.

The ‘Log progress’ option is effectively obsolete in the GUI, due to the progress bars in the GUI and therefore it will not be used a lot anymore.

This option is the same as the –p parameter of the command-line version of the verifier.

2.2.4.1.10 The ‘Ignore Scrambling’ checkbox

Forces the verifier to ignore certain flags in the files being verified indicating the data is scrambled. This allows e.g. the verification of a complete disc image prior to be transferred to the channel encoder, in which all sectors which will eventually be scrambled are already marked as such. When this option is not checked, the verifier will simply skip all these sectors without any verification!

2.2.4.1.11 The ‘Use ASA Lab Drive’ checkbox

Enables the special features of the ASA Lab DVD-ROM drive.

The extra functionality of such ASA Lab Verification Drive (JBE / ASD1) is:

- Reading in 2064 bytes per sector mode (parsing / verifying of sector header and EDC).
- Reading lead-in and/or lead-out areas incl. verifying of lead-in.
- Reading bitsettings of a disc.

2.2.4.2 The ‘Video settings’ tab

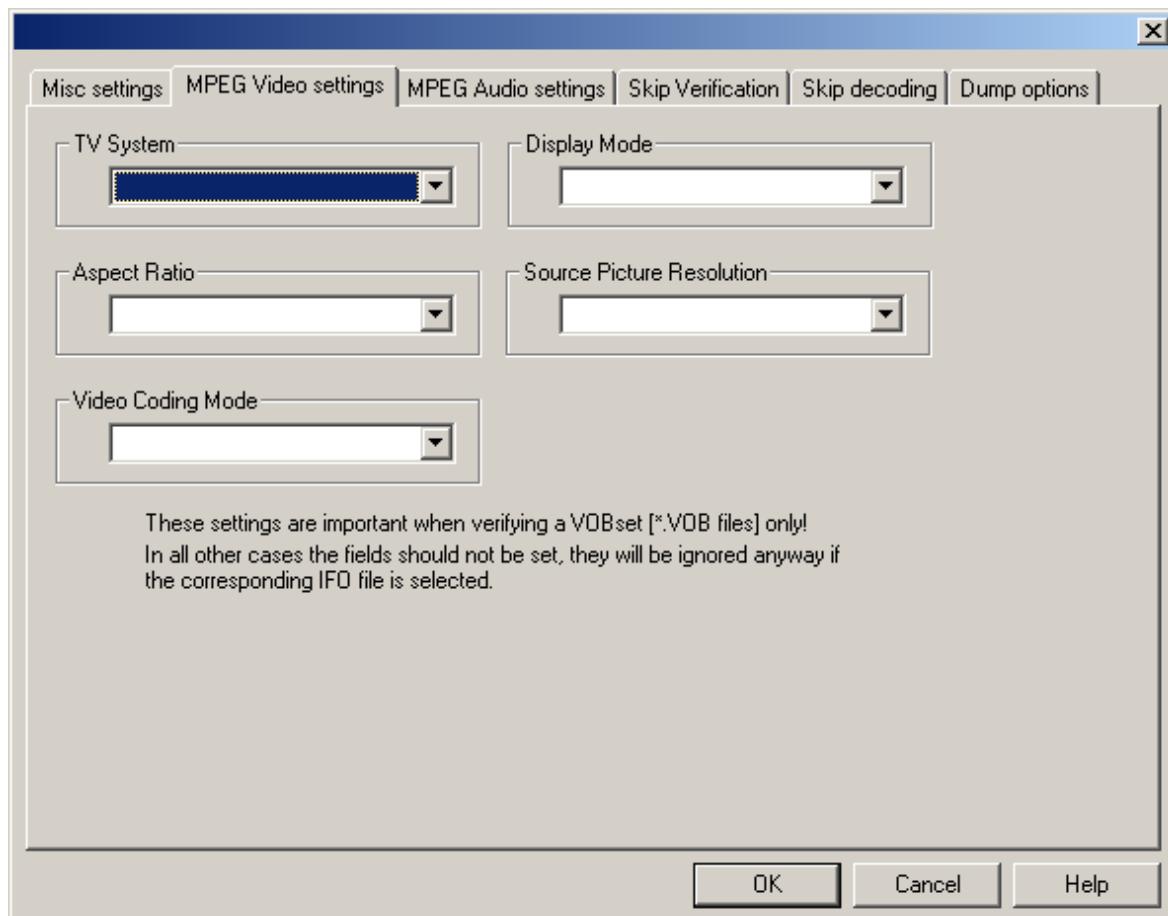


Figure 16: The video settings window

These settings allow entering “a-priori” knowledge of the disc or file contents. This enables some extra checks, e.g. cross checks with DVD data.

2.2.4.2.1 The ‘TV System’ listbox

This listbox allows the selection of PAL or NTSC (or none).

When there is no VMGI or VTSI data available, this setting really is required: When the user has no TV system selected (selected ‘none’), some checks will not be performed and some false messages can be reported.

2.2.4.2.2 The ‘Display mode’ listbox

This listbox allows selecting:

- None
- Both pan-scan and letter box
- Only pan-scan
- Only letter box.

2.2.4.2.3 The ‘Aspect ratio’ listbox

This optional setting allows selecting either 4 x 3 or 16 x 9 aspect ratio (or none).



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2.2.4.2.4 The 'Source picture resolution' listbox

This optional setting allows selecting various video picture resolutions:

- None
- 720 x 480 (ntsc), 720 x 576 (pal)
- 704 x 480 (ntsc), 704 x 576 (pal)
- 352 x 480 (ntsc), 352 x 576 (pal)
- 352 x 240 (ntsc), 352 x 288 (pal).

2.2.4.2.5 The 'Video coding mode' listbox

This optional setting allows to select either MPEG-1 or MPEG-2 video encoding (or none). The 'none' setting for each of this option can be used to force cross-reference data to be used.

2.2.4.3 The 'Audio settings' tab

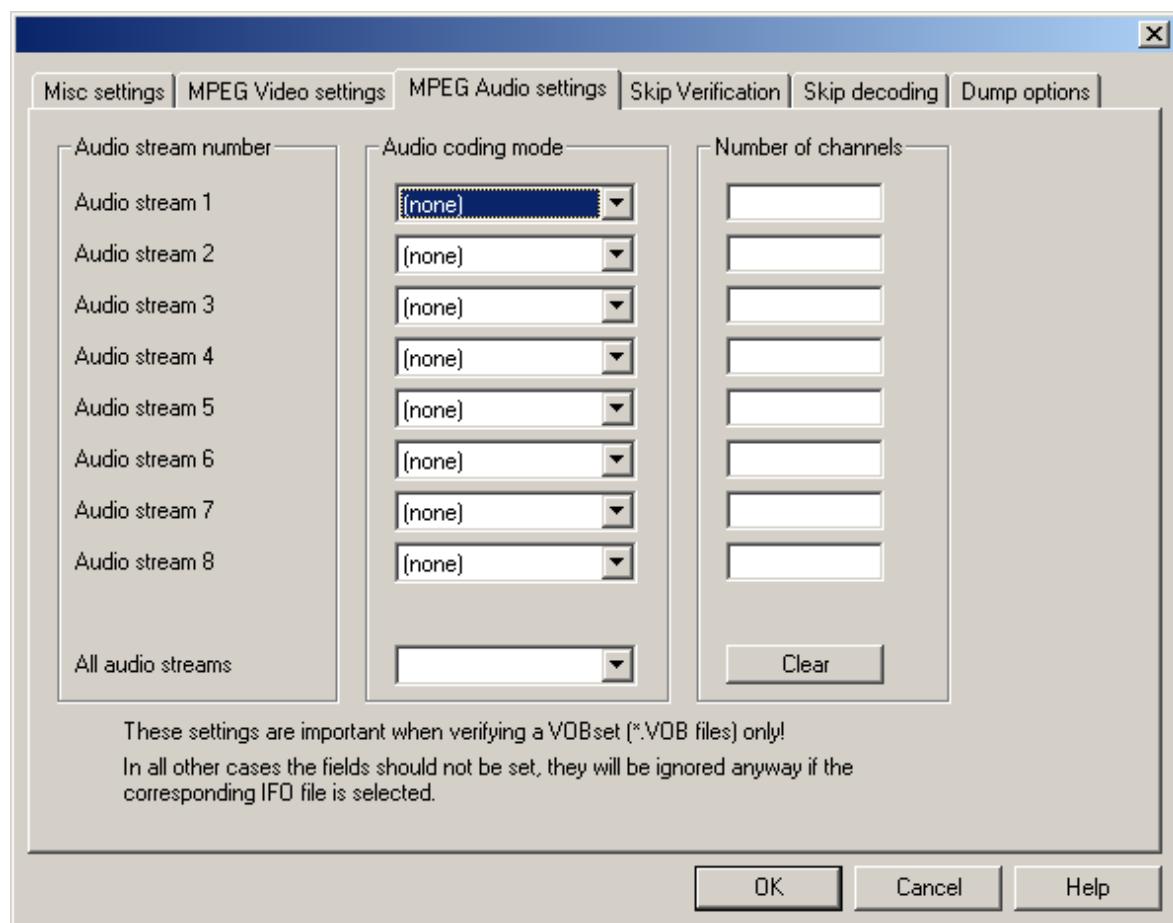


Figure 17: The audio settings window

The Audio settings window allows specifying the MPEG audio encoding type and number of audio channels for all MPEG encoded audio streams present in the selected VOBS file.

This is only necessary in case there is no matching VMGI file (for the VMG menu VOB VIDEO_TS.VOB) or VTSI file (for VTS menu VOB or a title VOBS).

The 'All audio streams' entry can be used to select the audio type and number of channels for all audio streams at once. The values for all audio streams will change immediately, allowing to override the settings if necessary.

Remark: The LFE channel, commonly noted as “.1” is counted as 1 additional channel, so “5.1” should be entered as 6 channels.

2.2.4.4 The ‘Skip decoding’ tab

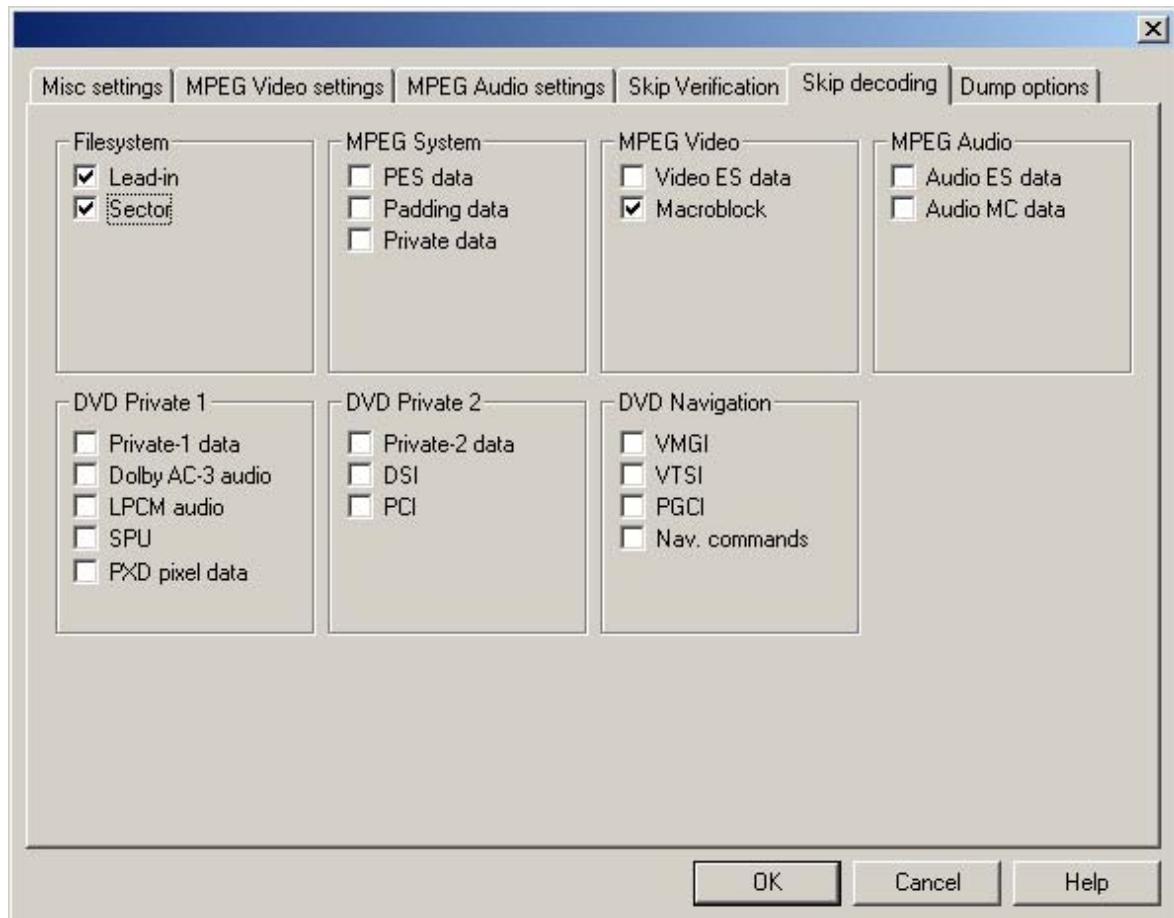


Figure 18: The skip decoding settings window

The ‘Skip decoding’ settings window allows specifying the data levels that should not be parsed. Sometimes it is useful not to decode the complete data stream, especially because not decoding some data elements could have a dramatic impact on the speed of the verification. Once a level is being skipped here, it cannot be selected to be dumped in the Dump settings window and verification of the level will automatically be skipped. Also, sub levels of the level selected in this window are affected. All affected levels are grayed-out in the Skip verification and Dump settings windows.

➔ Hint: Selecting the macroblock data level speeds up the verification process significantly. It might be useful when the video stream has been fully verified before and no errors were found at macroblock level.



2.2.4.5 The 'Skip Verification' tab

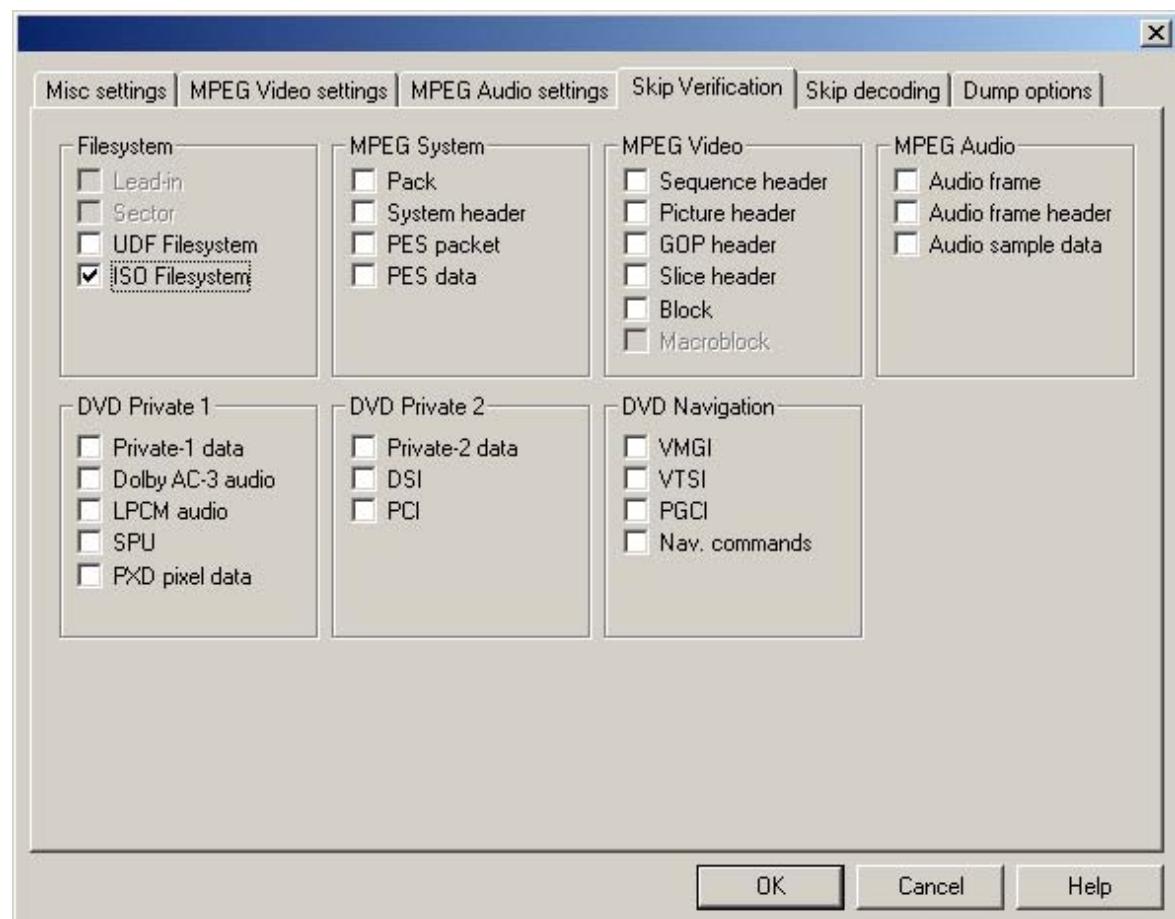


Figure 19: The skip verification settings window

The skip verification settings determine the levels that will not be verified. This can be used to ignore errors from a particular level of MPEG and/or DVD data, or to speed up the verification task. Levels that are not parsed (selected in the 'Skip decoding' settings window) appear ghosted and are automatically skipped for verification also.

2.2.4.6 The ‘Dump Options’ tab

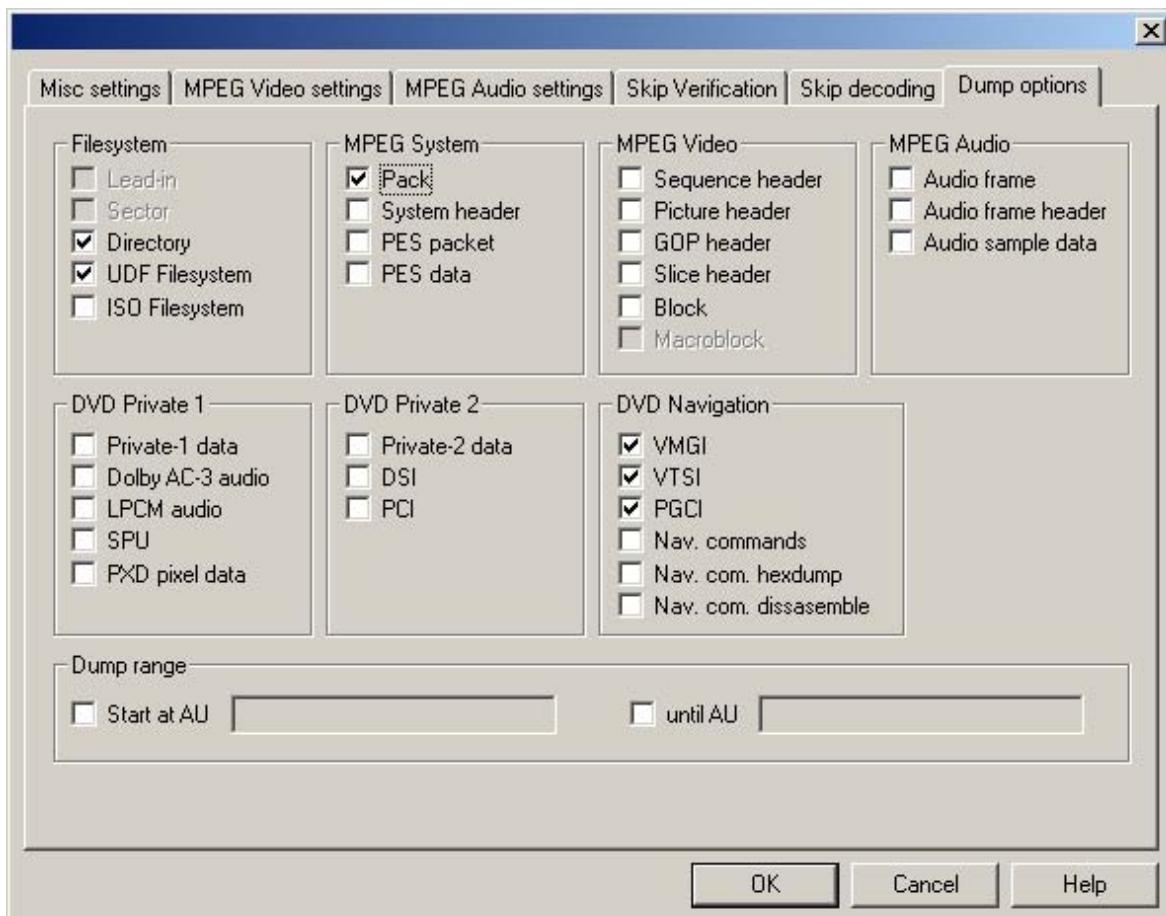


Figure 20: The dump settings window

The Dump settings window allows specifying the data levels to generate a contents dump (bit stream disassembly) for. Levels that are not parsed (selected in the ‘Skip decoding’ settings window) appear ghosted and are not selectable.

The Dump range settings (cf. below) are used for limiting the data generated when a dump option is selected. If selected, enter the number for the first access unit (AU) to be dumped in the first editbox and enter the number for the last access unit to be dumped in the second editbox.

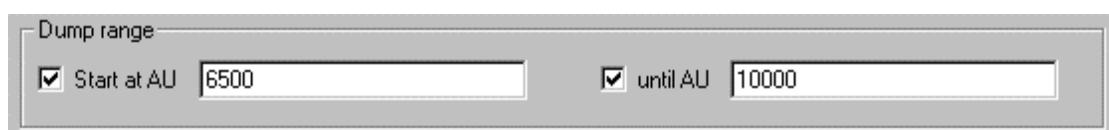


Figure 21: The dump range settings

It is not necessary to specify both start and end ranges.



2.2.5 Automated verifier runs

In order to facilitate automatic verifier runs from a batch (script) file, the program can be used to run automatically with pre-set settings. Whenever the program is started with the command line option ‘*Spathname*’, the program will start and end without the need for user intervention (the window still will be shown and the user still can stop the program and/or select the output window). The ‘*pathname*’ should be the complete path name of a settings file which was previously created.

To prepare for an automated verifier run, first start the DVD-Video verifier normally and set all necessary settings. If all settings are set, then save them to a file. Alternatively, test if the settings are correct by running the verification and then save the settings to a file. Use the pathname of this file in the ‘*Spathname*’ command line option.

2.2.6 Command-line options

Synopsis:

```
dvd_verf [-G(PEVAval2Dxmtgu?YPD)] [-Ydriveletter] [-W]
          [-X(FAMTVL)] [-eN] [-x(IORWXESP)] [-p]
          [-s(KYLXVGPSMBFHAsmtgluxay2pdCN)]
          [-d(KYLXVGPSMBFHAsmtgluxay2pdCN)]
          [-S(PEVMACUsmtgluxay2pdCN)]
          [-A] [-I] [-a(127)]
          [-B] [-b] [-R] [-h] [-v]
          [-fN] [-nN] [-NN] [-oN] [-ON]
          [-Dscriptfile] [-Eextfile] [-Llogfile] [-Zoutputdir]
          filename
```

It is recommended to specify all options in a script file, which can be fed to the verifier with the **-Dscriptfile** option. If an option is specified on both the command line and in a script file, then the latest specified options take precedence.

When combining the various command line options, the following rules should be considered:

- The option may appear in any order, they may even follow the file name.
- There is no space between an option and its parameter.
- If an option does not take a parameter, it may immediately be followed by another option.
- When no command line options are specified, the verifier simply echoes all allowed options.
- Upper and lower case parameters have different meaning.

Option	Parameter	Description	remark
-Gtype	v a P E V A 1 2 D m t g u ? Y p d x	input stream type: (default P) MPEG-1 video MPEG-1 audio MPEG-2 PS MPEG-2 PES MPEG-2 video MPEG-2 audio MPEG-2 private_stream_1 MPEG-2 private_stream_2 MPEG-2 DVD disc VMGI VTSI PGCI SPU Dolby AC-3 Linear PCM PCI DSI (DDP) Disc (image) (shows directory only)	
-Ydriveletter		Read from specified DVD-ROM drive <i>driveletter</i>	
-W		Specify use of the ASALE DVD-ROM drive, in combination with the -Y option	
-Xsubset	F A M T V L	specify data subset: (default All) specified files only All files on disc(image) VMGI and VMGM_VOBS as "-M" + VTSI and VTSM_VOBS as "-T" + Title VOBS Lead-in	
-eN		max N messages per error (default 1)	
-xtype	I O R W X E S P	ignore specified messages: (default none) ignore Info ignore Oddities ignore Recommendations ignore Warnings ignore Syntax Errors ignore Errors ignore System Errors ignore Pipe Errors	
-p		show progress info	
-slevel		skip verification of the specified levels (default none)	



		MPEG levels: K pack Y system_header L PES_packet X PES_packet data V sequence_header G gop_header P picture S slice M macroblock B block F audio frame H audio frame header A audio data DVD levels: s sector m VMGI t VTSI f ECMA/UDF file system g PGCI i ISO file system l private_stream_1 data u SPU x PXD data a Dolby AC-3 y Linear PCM z private_stream_2 data p PCI d DSI c Navigation Command n Disassembled Navigation Commands	
-dlevel	as -slevel	generate dump of the specified levels (default none)	
-Slevel	P E V M A C U as -slevel	skip decoding of the specified levels (default none) MPEG levels: PS data PES data Video ES data Video ES macroblock data Audio ES data Audio ES multi-channel data User private data DVD levels:	1
-A		skip verification of DVD specific requirements	5
-I		Ignore the scrambled data flags	
-aN		Interpret all Audio in Mux Stream as 1:MPEG-1/2:MPEG-2/7:Augmented	4
-B		Generate plot file of P-STD Buffer model	
-b		Generate plot file of VBV Buffer model	
-R		Generate bit stream analysis report	
-h		Show some help information	

-v		show program header (version information)	
-fN		Skip parsing first <i>N</i> -1 AU's (PS:pack/PES:packet)	2
-nN		Start dump at PACK <i>N</i>	2
-NN		End dump at PACK <i>N</i>	2
-oN		skip parsing first <i>N</i> -1 bytes	3
-ON		stop parsing at <i>N</i> bytes	3
-Dscript-file		use script file <i>scriptfile</i>	
-Eextfile		use extension bit stream <i>extfile</i>	
-Llogfile		Copy screen output to log file <i>logfile</i>	
-Zoutputdir		Full path (ending with slash) specifying output directory.	
<i>filename</i>		use data input file <i>filename</i>	

Remarks

1. This means:
 - for ‘lower’ layers: completely skipping the decoding of the layer. e.g. skip audio stream or padding stream decoding,
 - for ‘higher’ layers: skipping as much decoding as possible without interfering the decoding process of lower layers. For example, “skip PES stream decoding” will skip all non ES-stream relevant data and decode only A/V or private_1 streams.
2. Only available for PS and PES stream input. In case of a PS stream, only the pack/packet numbers and stream position of the top layer will reflect the specified start position; PES and SEQ layers will have their packet numbering and stream position starting from 0!
3. Only available for ES stream input.
4. With this option the type of audio in a multiplexed stream can be specified. Different types of audio in a multiplexed stream can not be specified with this option. However, this could be specified in a script file.
5. The -A option skips the application specific verification of the stream, which may be a pure MPEG stream as well as MPEG data embedded in a DVD data format.



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2.2.7 Script file

With the *-Dscriptfile* option a script file can be passed to the verifier in which, besides all command-line options, also more advanced options can be specified. If an option is specified both on the command line and in the script file, the latest specified option takes precedence. The syntax for the script file is given below.

Note that,

- t^+ means that t must occur 1 or more times.
- $u \mid v$ means that either (not both) the keyword u or v can be used.
- $[x]$ means that x is optional.
- $<y>$ means that y is a logical representation of a class of keywords.
- (z) means that z is a specification of one of the non-terminals in the script syntax.
- The order of the options is irrelevant, except for **inputfile** and **start_verification**.
- If the same option is specified more than once (by mistake) the last instance of that option will be used.
- *Italic text* is comment
- Gray text: this feature is not yet supported.

A script file must always begin with an input specifier. Any line starting with ‘!’ will be seen as comment. The following lines are valid specifications for the inputfile specifier:

```
showdir disc <driveletter>


```

<filename> = name of the input file. (preceded by full path if not in current directory)

<subset> = files [generate_xdata] [perform_xcheck] all / when applicable */
 | files [generate_xdata] [perform_xcheck] <filename>+ /* when applicable */
 | vmg [generate_xdata]
 | vts <vtsnr> [generate_xdata] [perform_xcheck]
 | vobs <vtsnr> [generate_xdata] [perform_xcheck]
 | lead-in*

<vtsnr> = 1 .. 99

A disc (image) is a collection of files, which is described by a file system. A file is a collection of sectors. Sectors also contain meta data, with information about the sector itself (sector headers).

The verifier can be instructed to verify the following:

- with <subset> = **files all**, a whole disc (image) will be verified, or
- with <subset> = **lead-in**, the lead-ins from a disc (image) will be verified, or
- with <subset> = **vmg**, the VMG IFO and menu VOB files from a disc (image) will be verified, or
- with <subset> = **vts** <vtsnr>, like **vmg** + the VTS IFO and menu VOB files from a disc (image) will be verified, or
- with <subset> = **vobs** <vtsnr>, like **vts** + the VTS title VOB files from a disc (image) will be verified, or
- with <subset> = **files** <filename>+, the specified files from a disc (image) will be verified.

perform_xcheck can be specified to cross-check settings or parameters between different streams (e.g. VMGI and VOBs or between VMGI and VTSI). These cross-checks however need data, stored in a xdata-file. This xdata-file will be generated (or updated when it already exists) with the **generate_xdata** option.

The **vobs** input type can be used to verify a title VOBs which is larger than 1GB (and thus consists of several VOBs files). The VOBs files as specified in the file list will be concatenated in order of appearance.

The following specifiers may follow the input specifier and are optional for the script file:

[**start_verification** **at_pack** | **at_packet** | **at_byte** <N>]

(where <N> is a natural number,
at_pack and at_packet are valid for PES and PS input,
at_byte is only valid for ES input)

[**outputdir**

<path>]

(where <path> is the full pathname (ending with a slash) of the directory for the logfile
and crosscheck file)

The following options may appear in any order:

[**log_progress**]

[**logfile** <filename>]

This option writes all output to file <filename>.

[**max_error** <N>]

When max_error is specified, all errors are reported at most <N> times. (default is 1 error)

Remark: Checks which are similar for e.g. audio and video data will be referenced by the same error number. If more streams are multiplexed into one VOB, these errors may be suppressed for one stream if the maximum error count was already reached for another stream of the VOB..

[**ignore** <mesg>+]

(where <mesg> = **informations** | **oddities** | **recommendations** |
errors | **warnings** | **syntax_errors** | **system_errors** |
pipe_errors | <N>)

This option can be used not to display a certain type of error or a specific error number.

[**gnuplot** **std_buf**]

Outputs the P-STD buffer contents to a gnuplot-compatible ascii-file, which afterwards can be viewed with gnuplot. (The program 'gnuplot' is a public domain tool).

[**linewidth** <N>]



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With this option the maximum linewidth of the output can be set.

[**skip_parsing** <skiplevel>+]
 (where <skiplevel> = PS_data | PES_data | VES_data | mblock_data | AES_data | AMC_data | padding_data | private_data | other_stream_data | lead-in | sector | vmgi | vtsi | pgci | priv1 | spu | pxd | priv2 | pci | dsi | nav_command | lpcm | ac-3)

VES_data = Video Elementary Stream data
 AES_data = Audio Elementary Stream data
 AMC_data = Audio MultiChannel data

[**skip_verification** <level>+]
 (where <level> = iso_filesystem | udf_filesystem | pack | system_header | pes_packet | pes_data | sequence_header | gop_header | picture | slice | macroblock | block | frame | frame_header | sample_data | lead-in | sector | filesystem | vmgi | vtsi | pgci | priv1 | spu | pxd | priv2 | pci | dsi | nav_command | lpcm | ac-3)

[**dump** [<Ns> [<Ne>]] <level>+]

Dump can be used to output the information of one or more specified levels in readable ASCII-format. <Ns> is the first Pack which will be dumped, <Ne> is the last. When <Ns> and/or <Ne> are omitted all AU's will be dumped.

[**context_dump** <level>+]

If an error is reported, this option dumps the information of the specified levels immediately preceding the error position.

[**appl_checks** disabled | enabled]

Enables/disables the constraints verification on MPEG-data. Default the verification is enabled.

[**video_coding_mode** mpeg1 | mpeg2]

When the input-stream contains no navigation-data (e.g. VTSI or VMGI) or has no way of determining the video-coding-mode (e.g. cross-data file) this option can be used to specify mpeg1 or mpeg2.

[**audio_coding_mode** <stream_nr> mpeg1 | mpeg2]+

(where <stream_nr> is the number of the stream, 0..7)

As video_coding_mode, but audio-coding-mode can be specified for each audio-stream.

[**tv_system** pal | ntsc]

[**display_mode** <N>]

N = 0..3:

0: Both Pan-scan and Letterbox

1: Only Pan-scan

2: Only Letterbox

3: reserved for Aspect-ratio 4:3

[**aspect_ratio** <N>]

N = 0, 3:

0: 4:3

3: 16:9

[**source_picture_resolution** <N>]

N = 0..3:

0: 720 x 480 (*ntsc*), 720 x 576 (*pal*)

1: 704 x 480 (*ntsc*), 704 x 576 (*pal*)

2: 352 x 480 (*ntsc*), 352 x 576 (*pal*)

3: 352 x 240 (*ntsc*), 352 x 288 (*pal*)

[**audio_channels** <stream_nr> <N>]

stream_nr = 0..7

N = 1..8

[**audio_app_mode** <stream_nr> **karaoke** | **surround**]

stream_nr = 0..7

[**dynamic_range_control** <stream_nr> **on** | **off**]

stream_nr range: 0..7

[**ignore_scrambling**]

When the parser encounters a PES_packet with the PES_scrambling_control set to something other than '00', the parser skips all PES packet payload, because it is scrambled. This payload cannot be unscrambled by the DVD verifier. When the PES_scrambling_control is inappropriately set to something other than '00', this scriptfile option can be used to override the PES_scrambling_control flag, enabling the DVD verifier to parse the PES packet payload normally.



2.3 Remarks & Tips

2.3.1 Guidelines for use

MPEG2 Video verification slows down the overall verification, which is mainly due to macroblock parsing and verification being pretty demanding. In order to speed up the verification the ‘Macroblock’ checkbox in the ‘Skip decoding’ settings window can be used to skip macroblock parsing. The use of a faster computer (processor) and/or a faster DVD drive (higher read speed) will also increase overall parsing and verification speed.

2.3.2 Cross Checks

Cross Checks data is automatically generated with a temporary file name and all possible crosschecks are always executed. The cross checks are only valid for all files that are included in the verification run.

2.3.3 Assumptions and Boundary conditions

P-STD buffers are all empty at start.

2.4 Troubleshooting

2.4.1 Verifier ERROR 5601, 4501 or 4601

The Cross Checks data file is automatically generated with a temporary non-standard file name. Cross check data is added during the verification of the basic navigation data (IFO) files such as the VMGI and VTSI files. Furthermore it is deleted after the verification run. As a consequence, when cross checks are desired, one always has to verify the basic files (first). If not, one will get a 5601 ERROR message (and possibly 4501 & 4601 ERRORS as well) saying that, lacking a crosschecks data file, the verifier will use some (possibly incorrect) default parameters or perform some checks not at all.

To avoid these errors, at the start of the verification run, select all files. In this case the cross check data is always generated.

2.5 Installation Issues

2.5.1 Setup

The tool installs as most Windows based tools by running a setup application, explaining its actions and prompting the user if some input is needed.

2.5.2 Unzip

When the tool is available as a ZIP set, unpacking is straightforward (the unzip tool help can give additional information if needed).

2.5.3 System Requirements

- Min. Pentium II 300 MHz recommended.
- DVD-ROM drive (the faster, the better)
- 64 MB RAM
- Windows NT v4.0 with [Service Pack 4](#) or [Service Pack 6](#),
Windows 2000 ([Service Pack 2](#)) or
Windows XP.

To verify sector headers and/or the lead-in of a disc, a special PHILIPS verification DVD-drive is required.

2.6 Exit codes

If for some reason the verifier encounters an insurmountable problem, the program will quit verification and display the following requester:



Figure 22: Exit codes

The exit code displayed in the requester indicates the nature of the problem.

The exit codes are reported to indicate a serious problem.

Exit code	Meaning	
1	Unable to create the log file	
2	Unable to open the input file	
3	Unable to open the output file	
5	User abort	
6	Error reading input file	
19	Nr of errors overflow	D
21	Mixed DOS & UNIX slashes ('/' and '\' were mixed)	
22	Missing slash in dir name (dir name should end with slash)	
23	Equal file names for input and output files	
31	Illegal input stream type	
33	Input stream does contain any startcode	
42	Audio seq. does not contain any sync	
60	Internal error, 0 length block passed	D
61	Complete pack : Unexpected EOI_CODE	



71	Negative position value indicates parsing problem	D
72	Too large position value indicates parsing problem	D
75	Too large bitpip read length, maximum of 32 bits can be read	D
76	Illegal bitpip read length	D
77	Too short bitpip look ahead read position	D
78	Illegal bitpip look ahead read position	D
79	Bit pipe bit offset non zero	D
81	Malloc or Calloc failed	
82	Realloc failed	
92	Too many command line options, maximum is 100	
96	Unsupported feature	
98	NULL pointer access	
99	Unexpected exit	
114	Unable to open the script file	
115	No input files have been specified	
116	Unable to open disc image	
117	File not found in the filesystem	
118	SDKA file open error in lead-in	
119	SDKA file write error in lead-in	
120	Linear PCM input (ES) is not supported	
121	Unknown Private-1 (ES) input is not supported	
122	Unknown Private-2 (ES) input is not supported	
123	Unexpected stream input (MPEG1 PES or MPEG1 PS stream)	
124	Unable to open the demux file	
125	Unable to open the STD buffer contents log file at a seamless ILVU boundary	
126	Unable to open the STD buffer contents log file	
130	Illegal audio type specified for -a command line option	
131	Illegal parameter for -x option	
132	Illegal parameter for -c option	
150	Illegal ILVU encountered	
151	Illegal navigation command type	
170	AC3 decoding state is illegal	
171	AC3 syncinfo illegal decoding state	
172	AC3 bsi illegal decoding state	
173	AC3 audblk illegal decoding state	
174	AC3 aux illegal decoding state	
175	LPCM illegal decoding state	
176	SPU: Illegal decoding state	
177	SPU DCSQT: Illegal decoding state	
178	SPU DCCMD: Illegal decoding state	
179	SPU DCCMD data: Illegal decoding state	
180	SPU PXD inc pix, unexpected run value	

Note: The last column specifies if the exit code is found in the Debug version of the verifier only.

3. Output Format

This section describes the format of messages generated by the DVD-Video Verifier and the output as a result of the dump options.

3.1 Messages

A message is generated if a check results in a violation. A message consists of the following parts:

- context of the check,
- severity of the violation (see 4.1.1: “Error Classes”),
- message number (see 4.1.3: “Check Groups”),
- Reference to table or section of the standard to which the message applies (see 4.1.2: “Specification References”),
- message descriptive text,
- position in current and higher layers, where the violation was detected.

Here is an example of a message.

```
>>> [MPEG] ERROR 1413 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :
    2 PES audio streams active at time 5059, bound only 1
in PES stream $D0 at byte 873 bit 0 (byte 9 of packet 1);
byte 23 of pack 35 (PRS stream byte 71703).
```

3.2 Dumps

When the dump option is enabled (see 2.3: “Command line options”) token descriptors are logged to the output.

For each level for which a dump is enabled all tokens and their values will be printed. Here is an example.

```
Audio sequence 0 is at byte 0;
PES $C0 byte 18 (byte 18 of packet 0);
PS byte 69664 (byte 32 of pack 34).
( 0: 0:0) syncword $FFF
( 0: 1:4) ID 1
( 0: 1:5) layer 2 (II)
( 0: 1:7) protection_bit 0
( 0: 2:0) bitrate_index 14 (384 kbit/s)
( 0: 2:4) sampling_frequency 1 (48 kHz)
( 0: 2:6) padding_bit 0
( 0: 2:7) private_bit 0
( 0: 3:0) mode 0 (stereo)
( 0: 3:2) mode_extension 0
( 0: 3:4) copyright 0
( 0: 3:5) original/home 1
( 0: 3:6) emphasis 0 (no emphasis)
( 0: 4:0) crc_check 55
( 0: 810:6) ext_bit_stream_present 1
( 0: 810:7) n_ad_bytes 2
( 0: 811:7) centre 1 (meaning: centre channel present)
```



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```

( 0: 812:1) surround 2 (meaning: stereo surround)
( 0: 812:3) lfe 1 (meaning: low frequency enhancement channel present)
( 0: 812:4) audio_mix 1 (meaning: mixed for a small listening room)
( 0: 812:5) dematrix_procedure 0
( 0: 812:7) no_of_multi_lingual_ch 0
( 0: 813:2) multi_lingual_fs 0
( 0: 813:3) multi_lingual_layer 0
( 0: 813:4) copyright_identification_bit 1
( 0: 813:5) copyright_identification_start 0
( 0: 813:6) mc_crc_check 51410
Audio sequence 16 is at byte 1152;
PES $D0 byte 17 (byte 17 of packet 0);
PS byte 70833 (byte 1201 of pack 34).
( 0: 0:0) ext_syncword $7FF
( 0: 1:4) ext_crc_check 46375
( 0: 3:4) ext_length 912
( 0: 4:7) ext_ID_bit 0
( 0: 846:7) incomplete data field (1 bit left over : $1)

```

For each important access unit a small header is printed. This header contains all relevant position information for the AU, like:

- type of the AU,
- number of the AU,
- position in current and higher layers, where the violation was detected,

For each token the following information will be printed:

(N: B:b) *field_name* *value* (*info*)

where,

- N gives the number of the AU,
- B gives the byte position relative to this AU,
- b gives the bit position relative to the byte B, where 0 is msb,
- *field_name* gives the token description,
- *value* gives the value of the token,
- (*info*) gives additional information about the token.

The space between the position of the token and the description increases with each sub level.

4. Error codes

4.1 Notation

The following variables are used to symbolically represent message specific information. In the actual verifier output they will be replaced with concrete values.

- %c character,
- %d integer decimal number,
- %f floating point decimal number,
- %s string of characters,
- %x hexadecimal number,
- %lu long unsigned number,
- %ld long integer decimal

4.1.1 Error Classes

The following error classes are used in the messages.

Error Class	Explanation
INFORMATION	A notable event in the stream (informative)
RECOMMENDATION VIOLATION	A violation against a recommendation
ODDITY	An odd situation or inconsistency in the stream
WARNING	A potential cause of errors
SYNTAX ERROR	A violation against the syntax, detected during parsing.
ERROR	A violation against a mandatory requirement
SYSTEM	A verifier error (non MPEG or DVD)
PIPE ERROR	A verifier error in the bit pipe handling

All SYNTAX ERRORS also print a look-ahead buffer with the next few bytes (max. 4) in the bit pipe. It is represented as follows.

```
>>> message <<<
[Look Ahead : $00 $01 $B3 $2D  (len : 32 bit) ]
```

The numbers after Look Ahead represent the next bytes from the stream in hexadecimal notation, followed by the number of bits. A maximum of 32 bits (4 bytes) can be printed.



4.1.2 Specification References

The references to the MPEG and DVD specifications used in the messages refer to:
 (see 1.4: "References")

Message Text	Reference
MPEG-2 Systems	[II 13818-1]
MPEG-2 Video	[II 13818-2]
MPEG-2 Audio	[II 13818-3]
MPEG-2 Conformance	[II 13818-4]
MPEG Systems	[II 11172-1]
MPEG-1 Video	[II 11172-2]
MPEG Video	[II 11172-2], [II 13818-2]
MPEG-1 Audio	[II 11172-3]
DVD	[DVD-1], [DVD-2], [DVD-3], [DVD-S]

When a verifier message contains a double MPEG reference, the first one is always a MPEG1 and the second a MPEG-2 reference. For example, in "(ref. MPEG Systems 2.4.4.2 | 2.5.3.6)", the first one is a reference to MPEG Systems; section 2.4.4.2 and the second to MPEG-2 Systems; section 2.5.3.6.

4.1.3 Check Groups

Check Group	Error number range
System error	0 - 999
MPEG-1 PRS checks	1100 - 1199
MPEG-1 System header checks	1200 - 1399
MPEG-1 PES checks	1400 - 1499
MPEG-1 Sequence header checks	1500 - 1619
MPEG-1 GOP checks	1620 - 1649
MPEG-1 Picture checks	1650 - 1749
MPEG-1 Slice checks	1750 - 1769
MPEG-1 Macroblock checks	1770 - 1799
MPEG-1 Videoblock checks	1800 - 1849
MPEG-1 Audio checks	1850 - 1949
MPEG-2 PRS checks	2300 - 2399
MPEG-2 PES checks	2400 - 2499
MPEG-2 Sequence header checks	2500 - 2619
MPEG-2 GOP checks	2620 - 2649
MPEG-2 Picture checks	2650 - 2749
MPEG-2 Slice checks	2750 - 2769
MPEG-2 Macroblock checks	2770 - 2799
MPEG-2 Videoblock checks	2800 - 2849
MPEG-2 Audio checks	2850 - 2899
MPEG-2 Descriptor checks	2900 - 2999
DVD System checks	3000 - 3009
DVD VOB checks	3010 - 3049
DVD Pack checks	3100 - 3149
DVD System header checks	3150 - 3199
DVD Packet checks	3200 - 3249
DVD PES checks	3250 - 3299
DVD Private stream checks	3300 - 3349
DVD Sequence header checks	3350 - 3399
DVD GOP checks	3400 - 3449
DVD Picture checks	3450 - 3479
DVD audio checks	3500 - 3599
DVD SPU checks	3600 - 3749
DVD AC3 checks	3750 - 3849
DVD LPCM checks	3850 - 3899
DVD VMGI checks	4000 - 4199
DVD VTSI checks	4200 - 4399
DVD PGCI checks	4400 - 4499
DVD PCI checks	4500 - 4599
DVD DS1 checks	4600 - 4799
DVD NCMD checks	4800 - 4899
DVD SEC checks	4950 - 4999
DVD Filesystem checks	5000 - 5599
DVD Xchecks	5600 - 5999



4.2 System checks

These messages are specific verifier system messages. They mostly indicate a problem with the system on which the verifier is running, or with the software tool's internal administration. They should never occur during 'normal' verification.

>>> [SYSTEM] SYSTEM ERROR 1 :

OPEN_FILE : Can't create log file 'filename' : 'error string'

The system was unable to create the logfile, reported is the filename specified as the logfile as well as the translated error number reported by the system.

>>> [SYSTEM] SYSTEM ERROR 2 :

OPEN_FILE : Can't open input file 'filename' : 'error string'

The system was unable to open the input file, reported is the filename as well as the translated error number reported by the system. This error is reported when:

- The specified script file cannot be opened.
- The specified input file cannot be opened.
- The specified file is not found in the filesystem when the input stream type is a disc or discimage.

>>> [SYSTEM] SYSTEM ERROR 3 :

OPEN_FILE ('function name') : Can't open output file 'filename' : 'error string'

The system was unable to open an output file, reported is the name of the function that tried to open the file, the filename and the translated error number reported by the system. This error is reported when:

- The demux option could not open the output file for the demultiplexed stream.
- The output file for any of the STD, T-STD, VBV buffer dumps could not be opened.

>>> [SYSTEM] SYSTEM ERROR 6 :

FILE_INPUT : Error reading input file : 'filename'

The system encountered an error while reading a file, reported is the filename specified. This error occurs when the number of bytes read from the file does not equal the requested number of bytes.

>>> [SYSTEM] WARNING 10 :

GEM : duplicate client/event link discarded for event 'hexadecimal event number' !

This warning indicates a programming error, the development team should be consulted.

>>> [SYSTEM] WARNING 11 :

GEM : duplicate client/event link for event 'hexadecimal event number': increased priority to 'priority number' !

This warning indicates a programming error, the development team should be consulted.

>>> [SYSTEM] WARNING 12 :

GEM : Event 'hexadecimal event number' to unlink not in the event call-back list !

This warning indicates a programming error, the development team should be consulted.

>>> [SYSTEM] WARNING 13 :

GEM : Client for event 'hexadecimal event number' to unlink not in the client/method call-back list !

This warning indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 19 :

Report module : 'System | MPEG | MPEG-1 | MPEG-2' verification message nr. 'number' is larger than the allowed number of errors ('maximum number').

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 21 :

Specified ‘filename type’ name (‘filename’)
mixes UNIX and PC/DOS slashes !!!

When the complete filename is created from the specified output directory and filename, only one type of slashes may be used, i.e. either PC/DOS (‘\’) or UNIX (‘/’) type slashes.

>>> [SYSTEM] SYSTEM ERROR 22 :

Specified output directory (‘directory name’)
is not terminated by a slash !

The output directory should be terminated with a slash.

>>> [SYSTEM] SYSTEM ERROR 23 :

Specified input file (‘filename’) and
log file (‘filename’) are identical !

The user should specify different filenames for the input file and the log file, which is an output file. This error prevents an endless running task.

>>> [SYSTEM] INFORMATION 30 :

ANALYSE_STREAM : Input stream type probably is a ‘streamtype’ (found start code ‘hexadecimal start code’ at byte ‘position’).

This information reports that the specified input streamtype is probably not correct because another start code was found then specified at the command-line with option –Gtype at a valid position (i.e. No emulated start code) that suggests a different streamtype.

This information message is given when using the command-line verifier with wrong –Gtype parameter.

This information is usually preceded by the SYSTEM ERROR 31.

>>> [SYSTEM] SYSTEM ERROR 31 :

ANALYSE_STREAM : Not a ‘streamtype’ input stream !!!

The start code belonging to the specified streamtype is not found, the following table show the start codes used by streamtypes:

Streamtype	Start codes
PS	0x000001B9, 0x000001BA, 0x000001BB
PES	0x000001BC 0x000001FF
Video ES	0x0000000000, 0x00000101 0x000001AF, 0x000001B2, 0x000001B3, 0x000001B4, 0x000001B5, 0x000001B7, 0x000001B8

>>> [SYSTEM] INFORMATION 32 :

ANALYSE_STREAM : Input stream does not start with a start code.

The input stream should start with a start code. Data will be skipped until a valid start code is found in the stream.

>>> [SYSTEM] INFORMATION 33 :

ANALYSE_STREAM : Input buffer does not contain any start code.

The input buffer contains the start of the input stream, its size is dependent on the verification application, but is generally in the range of 32KB to 256 KB. In this buffer, no start code was found, which usually means that the stream is not an MPEG stream. This information is usually preceded by INFORMATION 32.

>>> [SYSTEM] INFORMATION 41 :

ANALYSE_STREAM : Audio seq. does not start with a sync.

This information is reported when the input streamtype is set to Audio ES and the stream did not start with an Audio syncword (0xFFFF). Data will be skipped until a syncword is found in the stream.



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>>> [SYSTEM] SYSTEM ERROR 42 :

ANALYSE_STREAM : Audio seq. does not contain any sync !

This information is reported when the input streamtype is set to Audio ES and the input buffer did not contain any Audio syncword (0xFFFF). The input buffer contains the start of the input stream, its size is dependent on the verification application, but is generally in the range of 32KB to 256 KB. This error is usually preceded by INFORMATION 41.

>>> [SYSTEM] INFORMATION 51 :

ANALYSE_STREAM : Transport stream does not start with a sync.

This information is only applicable for verification applications that support Transport streams and is reported when the stream did not start with an Transport Stream syncword (0x47). Data will be skipped until a syncword is found in the stream.

>>> [SYSTEM] SYSTEM ERROR 52 :

ANALYSE_STREAM : Transport stream does not contain any sync !

This information is only applicable for verification applications that support Transport streams and is reported when the input buffer did not contain any Transport Stream syncword (0x47). The input buffer contains the start of the input stream, its size is dependent on the verification application, but is generally in the range of 32KB to 256 KB. This error is usually preceded by INFORMATION 51.

>>> [SYSTEM] SYSTEM ERROR 53 :

FILIO_READ_FILE : Cannot read beyond the EOF !

The parser needs to read from the file, but the file pointer arrived at the end of the file, meaning no data can be read from the file. This error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 54 :

FILIO_READ_FILE : Parsing completed, but I/O buffer is not empty !

The parser is finished reading data from the file, but the file pointer did not arrive at the end of the file, meaning more data can be read from the file. This error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 60 :

‘function name’ passed a zero length block of data !

This error reports an error in one of the parser functions. This warning could indicate a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 61 :

parser_input : Unexpected MPEG_PROGRAM_END_CODE !

The parser was expecting a new pack, but instead it encountered an MPEG program end code.

>>> [SYSTEM] SYSTEM ERROR 63 :

parser_input : Input buffer does not contain ‘start code type string’ start code ! (‘hexadecimal start code’)

The parser uses an input buffer of a complete pack or complete packet.

>>> [SYSTEM] INFORMATION 64 :

parser_input : Emulated start_code ‘hexadecimal start code’ !

The parser encountered some bytes in the stream, that emulate a known start code. This could pose a problem if the parser or player should have to recover.

>>> [SYSTEM] INFORMATION 65 :

parser_input : Input buffer too small to contain 1 complete pack. retrieving complete packets...

>>> [SYSTEM] SYSTEM ERROR 66 :

parser_input : ‘Packet type string’ length (‘length’) inconsistent with distance between start codes (‘length’) !

The previous PES_packet or pack was too long.

>>> [SYSTEM] SYSTEM ERROR 67 :

PSI-‘table name’ parsing : Invalid state ‘number’

This error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 69 :

PSI parsing (psi_decode_prog_nr) : Invalid type ‘number’

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 71 :

‘function name’ results in NEGATIVE position value (‘value’ - ‘value’) !

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 72 :

‘function name’ results in a TOO LARGE (> 32 bit) position value (‘value’ - ‘value’) !

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 75 :

Bit pipe error in ‘function name’ :

Specified length (‘value’) larger than available (‘number’) !

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 76 :

Bit pipe error in ‘function name’ :

Specified length (‘value’) smaller or larger than allowed (‘minimum value’..’maximum value’) !

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 77 :

Bit pipe error in ‘function name’ :

Specified pipe read position (‘value’) shorter than allowed (‘number’) !

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 78 :

Bit pipe error in ‘function name’ :

Specified pipe read position (‘value’) should be in [‘minimum value’..’maximum value’] !

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 79 :

‘function name’ : Detected a non-zero bit offset (‘value’)

This might indicate a serious parsing problem.

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 81 :

Requested ‘C|M’alloc of ‘value’ bytes FAILED !

This system error indicates the program could not allocate the number of bytes necessary. This could be due to low memory of a programming error. Close some applications and try again.

>>> [SYSTEM] SYSTEM ERROR 82 :

Requested realloc of address ‘hexadecimal address’ to ‘value’ bytes FAILED !

This warning indicates the program could not allocate the number of bytes necessary. This could be due to low memory of a programming error. Close some applications and try again.



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>>> [SYSTEM] SYSTEM ERROR 91 :

Illegal command-line option !

The user specified an illegal command line option. Check the user manual for all valid command line options and try again.

>>> [SYSTEM] SYSTEM ERROR 92 :

Too many options for CmdLn to hold !

The user specified command line options with more than 100 characters, which is too large. Reduce

>>> [SYSTEM] SYSTEM ERROR 95 :

!!! ‘profile or level type’ NOT or not sufficiently TESTED !!!

This system error indicates that the specified profile or level is not tested yet. Only main profile, main level is fully tested.

>>> [SYSTEM] SYSTEM ERROR 96 :

!!! ‘profile or level type’ NOT SUPPORTED or IMPLEMENTED (YET) !!!

This system error indicates that the specified profile or level is not supported yet. Only main profile, main level is fully supported.

>>> [SYSTEM] SYSTEM ERROR 98 :

NULL pointer reference in function ‘function name’ !

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 99 :

! ‘error string’ !

This system error indicates a programming error, the development team should be consulted.

>>> [SYSTEM] SYSTEM ERROR 101 :

No pack data (mux_rate, SCR) available

A packet cannot be parsed without pack information, which was the case here.

>>> [SYSTEM] SYSTEM ERROR 201 :

complete_t_packet : Stream does not start with a transport_packet sync.

>>> [SYSTEM] SYSTEM ERROR 202 :

complete_t_packet : No transport_packet sync_bytes where expected !

>>> [SYSTEM] ERROR 901 (ref. MPEG-2 Systems 2.4.2.1) :

SCR tolerance exceeded by ‘value’

>>> [SYSTEM] ERROR 902 (ref. MPEG-2 Systems 2.4.2.2) :

PCR tolerance exceeded by ‘value’

>>> [SYSTEM] ERROR 903 (ref. MPEG-2 Compliance 9.1.3) :

Audio sample frequency tolerance exceeded by ‘value’

>>> [SYSTEM] ERROR 904 (ref. MPEG-2 Compliance 9.1.3) :

Video sample rate tolerance exceeded by ‘value’

4.3 MPEG checks

4.3.1 Common MPEG-1 and MPEG-2 checks

4.3.1.1 MPEG PS checks

>>> [MPEG] SYNTAX ERROR 1103 (ref. MPEG Systems 2.4.3.2 | 2.5.3.4) :

Pack too short

The Pack was less than 12 bytes for MPEG-1 streams and 14 bytes for MPEG-2 streams.

>>> [MPEG] SYNTAX ERROR 1104 :

No packs in program stream preceding `MPEG_program_end_code`

At least 1 pack must precede the `MPEG_program_end_code`.

>>> [MPEG] SYNTAX ERROR 1105 :

Stream data following `MPEG_program_end_code`

No data should follow an `MPEG_program_end_code`.

>>> [MPEG] SYNTAX ERROR 1106 :

Expecting `packet_start_code` etc. (Look Ahead : ‘hexadecimal buffer contents’)

The first 4 bytes of the Pack’s payload must be a valid start code. The look ahead shows what the first 4 bytes of the payload are. This error is usually due to a recovery action that did not pickup the parsing process at the right place (possible emulated start code).

>>> [MPEG] ERROR 1108 (ref. MPEG systems 2.4.4.1 | 2.5.3.2) :

Program stream is not terminated by an `MPEG_program_end_code`.

>>> [MPEG] SYNTAX ERROR 1109 (ref. MPEG-1 Systems 2.4.3.2) :

`Pack_header` marker 0010 expected

>>> [MPEG] SYNTAX ERROR 1110 (ref. MPEG Systems 2.4.3.2 | 2.5.3.4) :

`Pack_header` marker_bit ‘number’ is 0

This error is reported when any of the marker bits in the `Pack_header` is not equal to ‘1’.

>>> [MPEG] ERROR 1117 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

`Pack_header` SCR difference is ‘difference’, should be in ‘min’ ... ‘max’ (c1 in ‘min’ ... ‘max’)

This error is only reported when the Program stream uses a fixed bitrate. The error reports that the bitrate fluctuates too much to be considered fixed. This error can indicate an erroneous value for the `fixed_flag` field, in which case this error will be generated very often. It can also indicate an invalid SCR value, in which case the range for a valid SCR difference is given (first range in the error message).

>>> [MPEG] ERROR 1120 (ref. MPEG Systems 2.4.4.2 | 2.5.3.4) :

`Pack_header` `program_mux_rate` is 0

The `program_mux_rate` field in the `Pack_header` is forbidden to be coded as ‘0’, meaning a muxrate of 0 bytes/sec.

>>> [MPEG] ERROR 1125 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

`Pack_header` `program_mux_rate` is ‘bitrate’ Mbit/s, `system_header` `rate_bound` only ‘bitrate’

The `program_mux_rate` from the `Pack_header` must be less than the `rate_bound` specified by the `system_header`.



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>>> [MPEG] ERROR 1130 (ref. MPEG Systems 2.4.4.2 | 2.5.3.4) :

Pack_header SCR difference is ‘difference’, should be at least ‘difference’
The difference of two succeeding Pack’s SCRs should be at least:

(CLOCK_FREQUENCY * (pack length - 9 {=last byte of SCR})/byterate of previous pack) +
(CLOCK_FREQUENCY * (9 {=last byte of SCR}/ byterate of current pack))

Note: CLOCK_FREQUENCY is 90 KHz for MPEG-1 PS and 27 MHz for MPEG-2 PS

>>> [MPEG] ERROR 1131 (ref. MPEG Systems 2.4.5.2 | 2.7.1) :

Pack_header SCR difference is ‘difference’ [90kHz ticks], should be at most ‘number’ seconds (= ‘difference’).
The difference of two succeeding Pack’s SCRs should be at most 0.7 seconds, or (CLOCK_FREQUENCY * 0.7) clicks apart.

Note: CLOCK_FREQUENCY is 90 KHz for MPEG-1 PS and 27 MHz for MPEG-2 PS

>>> [MPEG] ERROR 1141 (ref. MPEG Systems 2.4.6 | 2.7.9) :

Previous pack contains ‘value’ packet(s), should be <= ‘calculated value’ for a CSPS-stream
The Pack of a CSPS constrained MPEG Program stream may contain only the number of packets calculated with following formula:

(SCR difference * rate_bound {from system header}) /
(CLOCK_FREQUENCY / 300 {max pack rate} * 400 {bits/sec} * mux_rate_lim)

Note: CLOCK_FREQUENCY is 90 KHz for MPEG-1 PS and 27 MHz for MPEG-2 PS

mux_rate_lim is 5000000 for MPEG-1 PS, 2000000 for MPEG-2 PS when
packet_rate_restriction_flag from pack header equals 0 and 4500000 for MPEG-2 PS when
packet_rate_restriction_flag from pack header equals 1.

>>> [MPEG] ERROR 1142 (ref. MPEG Systems 2.4.6 | 2.7.9) :

‘number’ packet(s) in pack preceding EOI-code, max. ‘number’ allowed
The Pack in which an MPEG_program_end_code exists, may contain a maximum number of packets calculated with following formula:

when rate_bound {in bits/sec} <= mux_rate_lim:
(pack length * 300 {max pack rate} / byte rate

when rate_bound {in bits/sec} > mux_rate_lim:
(pack length * rate_bound {from system_header} * (300 {max pack rate} * 400 {bits/sec} / mux_rate_lim)) /
byte rate

Note: mux_rate_lim is 5000000 for MPEG-1 PS, 2000000 for MPEG-2 PS when
packet_rate_restriction_flag from pack header equals 0 and 4500000 for MPEG-2 PS when
packet_rate_restriction_flag from pack header equals 1.

4.3.1.2 MPEG System header checks

>>> [MPEG] SYNTAX ERROR 1200 (ref. MPEG Systems 2.4.3.2 | 2.5.3.6) :

 System_header too short

This error indicates a problem with the header_length field or with the decoding of the P-STD_buffer fields. It is caused by the parser that wants to parse more data than available.

>>> [MPEG] ERROR 1201 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

 System_header preceded by ‘number’ packets in this pack

The System_header may be present in any Pack of a Program stream, but must be located immediately following the Pack header. So no packets may precede the system_header.

>>> [MPEG] ERROR 1202 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

 First pack in this stream does not contain a system header

It is mandatory that the first Pack in a Program Stream carries the system header.

>>> [MPEG] ERROR 1203 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

 System_header header_length indicates ‘number’ bytes, ‘number’ decoded

The parser did not decode the number of bytes indicated by the header_length field. This could indicate a problem in the header_length field value, or an invalid stream_id.

>>> [MPEG] ERROR 1204 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

 System_header marker_bit ‘number’ is 0

All marker_bit fields should be encoded as ‘1’.

>>> [MPEG] ERROR 1205 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

 System_header marker 11 expected

The marker ‘11’, following the stream_id field was not found in the stream.

>>> [MPEG] ERROR 1210 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

 System_header rate_bound is ‘value’ Mbit/s, but mux_rate is ‘value’

The program_mux_rate from the Pack header in the PS is larger than the muxrate specified by the rate_bound field. The rate_bound field specifies the maximum combined muxrate of all ES in the PS.

>>> [MPEG] ERROR 1211 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

 System_header rate_bound is ‘value’ Mbit/s, previous occurrence ‘value’

Once specified, the rate_bound should remain the same in all system_headers in the PS.

>>> [MPEG] ERROR 1212 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

 System_header audio_bound is ‘value’, should be <= 32

MPEG specifies a maximum of 32 audio ES in a PS.

>>> [MPEG] ERROR 1213 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

 System_header audio_bound is ‘value’, previous occurrence ‘value’

Once specified, the audio_bound should remain the same in all system_headers in the PS.

>>> [MPEG] ERROR 1214 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

 System_header fixed_flag is ‘value’, was ‘value’ on previous occurrence

Once specified, the fixed_flag should remain the same in all system_headers in the PS.

>>> [MPEG] ERROR 1215 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

 System_header CSPS_flag is ‘value’, was ‘value’ on previous occurrence

Once specified, the CSPS_flag should remain the same in all system_headers in the PS.



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>>> [MPEG] ERROR 1220 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

System_header audio_lock_flag is ‘value’, was ‘value’ on previous occurrence

Once specified, the audio_lock_flag should remain the same in all system_headers in the PS.

>>> [MPEG] ERROR 1230 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

System_header video_lock_flag is ‘value’, was ‘value’ on previous occurrence

Once specified, the video_lock_flag should remain the same in all system_headers in the PS.

>>> [MPEG] ERROR 1240 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

System_header video_bound is ‘value’, should be <= 16

MPEG specifies a maximum of 16 video ES in a PS.

>>> [MPEG] ERROR 1241 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

System_header video_bound is ‘value’, previous occurrence ‘value’

Once specified, the video_bound should remain the same in all system_headers in the PS.

>>> [MPEG] ERROR 1244 (ref. MPEG-1 Systems 2.4.4.2) :

System_header reserved_byte is ‘hexadecimal value’, should be 0xFF

All reserved bytes should be coded as all-‘1’, i.e. 0xFF.

>>> [MPEG] ODDITY 1245 :

System_header empty STD-buffer list

No streams were specified at the end of the system_header, where normally the P-STD_buffer fields are defined. This would mean that no elementary streams are present in the PS, as each ES present in the PS shall have its P-STD_buffer_bound_scale and P-STD_buffer_size_bound specified exactly once in each system_header.

>>> [MPEG] ERROR 1246 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

System_header stream_id is ‘value’, should be 0xB9, 0xB8, or in 0xBC..0xFF

>>> [MPEG] ERROR 1247 (ref. MPEG Systems 2.4.4.2 | Tab.2-19) :

System_header stream_id ‘value’ refers to a reserved (data)stream

>>> [MPEG] ERROR 1250 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

‘Audio | Video’ wildcard for STD_buffer_size_bound redefines streams ‘numbers’

The system_header specified an Audio or Video wildcard stream_id, but an Audio or Video stream was already defined in the P-STD_buffer list.

>>> [MPEG] ERROR 1251 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

STD_buffer_size_bound for stream ‘hexadecimal stream ID’ missing, was previously explicitly defined
The definition of the stream mentioned in the error was not found in the current system_header, but was defined in the previous system_header.

>>> [MPEG] ERROR 1252 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

System_header STD_buffer_bound_scale is ‘value’ for ‘Audio | Video’ stream

The P-STD_buffer_bound_scale should have the value ‘0’ when the previous stream_id in the list indicates an Audio stream. The P-STD_buffer_bound_scale should have the value ‘1’ when the previous stream_id in the list indicates an Video stream.

>>> [MPEG] ERROR 1253 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

STD_buffer_size_bound for stream ‘hexadecimal stream ID’ is ‘value’ bytes, previously ‘value’

Once specified, the P- STD_buffer_size_bound should remain the same for a specific stream_id, in all system_headers in the PS.

>>> [MPEG] ERROR 1254 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

STD_buffer_size_bound defined for ‘Audio | Video’ stream ‘hexadecimal stream ID’, wildcard has previously been used

The P- STD_buffer_size_bound is specified for an Audio or Video stream, but in a previous system_header, the P- STD_buffer_size_bound for this stream was specified using the wildcard stream_id for that type (Audio or Video) of streams.

>>> [MPEG] ERROR 1255 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

STD_buffer_size_bound redefined for stream ‘hexadecimal stream ID’

Each ES present in the PS shall have its P-STD_buffer_bound_scale and P-STD_buffer_size_bound specified exactly once in each system_header. This error reports the stream_id of a stream that has been defined more than once.

>>> [MPEG] ERROR 1256 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

STD_buffer_size_bound for stream ‘hexadecimal stream ID’ previously not defined

Once specified, the P- STD_buffer list should remain the same for all system_headers in the PS. This stream_id has previously not defined.

>>> [MPEG] ERROR 1257 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

STD_buffer_size_bound for ‘Audio | Video’ stream ‘number’ is ‘value’ bytes, previously ‘value’

Once specified, the P- STD_buffer_size_bound specified with the wildcard stream_id should remain the same for all stream_ids, in all system_headers in the PS.

>>> [MPEG] ERROR 1260 (ref. MPEG Systems 2.4.5.6 | 2.7.8) :

Packet not preceded by system header in this stream

4.3.1.3 **MPEG PES checks**

>>> [MPEG] SYNTAX ERROR 1400 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :

PES_packet header too short

This error indicates a problem with the PES_packet_length field or with the decoding of the PES_packet, possibly due to some flags that are set to ‘1’ inadvertently. Generally, the error is caused by the parser that wants to parse more data than available.

>>> [MPEG] SYNTAX ERROR 1401 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :

PES_packet marker_bit ‘number’ is 0

All marker_bits should be codes as ‘1’.

>>> [MPEG] SYNTAX ERROR 1402 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :

PES_packet has invalid timestamp mark (‘value’)

This error is reported when the marker bits just before the PTS[32..30] are invalid. These bits should be coded as ‘0010’ when only the PTS is encoded, and ‘0011’ when the PTS_DTS_flags indicate that both DTS and PTS are encoded.

>>> [MPEG] SYNTAX ERROR 1403 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :

PES_packet timestamp mark 0001 expected

This error is reported when the 4 bits following the PTS[14..0] and marker_bit fields are not coded as ‘0001’, when the PTS_DTS_flags indicate that both PTS and DTS should be encoded.

>>> [MPEG] ERROR 1411 (ref. MPEG Systems 2.4.4.2 | Tab.2-19) :



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PES_packet reserved stream ID : ‘hexadecimal stream ID’

>>> [MPEG] ERROR 1412 (ref. MPEG Systems 2.4.4.2 | Tab.2-19) :
PES_packet reserved data stream ID : ‘hexadecimal stream ID’

>>> [MPEG] ERROR 1413 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :
‘number’ PES audio streams active at time ‘time string’, bound only ‘value’
At some time in the PS, more audio streams were active than specified in the system_header.

>>> [MPEG] ERROR 1414 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :
STD_buffer_size_bound for ‘stream type’ stream ‘number’ missing, packet(s) exist
Packets from the reported stream type and number were found in the PS, but the P-STD_buffer_size_bound for the reported streams was not specified in the system_header by using the wildcard stream_id.

>>> [MPEG] ERROR 1419 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :
Packet for stream ‘hexadecimal stream ID’ appears, no corresponding STD_buffer_size_bound in system header
Packets from the reported stream_id were found in the PS, but the P-STD_buffer_size_bound for the reported stream_id was not specified in the system_header.

>>> [MPEG] SYNTAX ERROR 1420 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :
PES_packet header is ‘value’ bytes, packet_length + 6 only ‘value’
The decoded PES_packet is longer than the PES_packet_length + 6 bytes. This could be caused by some flags that have inadvertently been set to ‘1’, causing the parser to parse more data than intended.

>>> [MPEG] PIPE ERROR 1421 (ref. MPEG Systems 2.4.4.3 | 2.5.3.7) :
Skipped packet extends past end of bit pipe

>>> [MPEG] SYNTAX ERROR 1422 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :
PES_packet_length is ‘value’, should be <= ‘value’

>>> [MPEG] SYNTAX ERROR 1424 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :
PES_packet contains too many stuffing bytes (‘number’ > max ‘number’)
The maximum number of stuffing bytes in a PES_packet:

MPEG-1	16
MPEG-2	32

>>> [MPEG] SYNTAX ERROR 1425 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :
PES_packet stuffing byte[‘index’] is ‘hexadecimal value’, should be 0xFF
All stuffing bytes should be coded as 0xFF.

>>> [MPEG] ERROR 1428 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :
‘number’ PES video streams active at time ‘time string’, bound only ‘number’
At some time in the PS, more video streams were active than specified in the system_header.

>>> [MPEG] ERROR 1430 (ref. MPEG Systems 2.4.5.5 | 2.7.7) :
No STD_buffer_size in first packet of ‘Audio | Video’ stream ‘number’
The first packet of a Video or Audio stream should specify the P-STD_buffer_size in the PES_packet extension part.

>>> [MPEG] ERROR 1431 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :
PES_packet P-STD_buffer_scale is ‘value’ in ‘Audio | Video’ packet

The P-STD_buffer_bound_scale should have the value ‘0’ when the preceding stream_id indicates an Audio stream. The P-STD_buffer_bound_scale should have the value ‘1’ when the preceding stream_id indicates a Video stream.

>>> [MPEG] ERROR 1432 (ref. MPEG Systems 2.4.6 | 2.7.9) :

PES_packet P-STD_buffer_size is ‘value’ bytes, should be <= ‘value’ for a CSPS stream
This error is only reported for Video PES_packets and issued for each PES_packet. The P-STD_buffer_size specified an invalid value. Valid values are calculated according:

$$\begin{aligned} BS_{vbv} &= vbv_buffer\ size \\ BS_{add} &= \text{MAX}(6144, R_{v\ max} * 0.001) \end{aligned}$$

$R_{v\ max}$ is the maximum video bitrate of the ES.

P-STD_buffer_size for video <= BS_{vbv} + BS_{add}

>>> [MPEG] ERROR 1433 (ref. MPEG Systems 2.4.6 | 2.7.9) :

PES_packet P-STD buffer size is ‘value’ bytes, should be <= 4096 (CSPS)
This error is only reported for Audio PES_packets.

>>> [MPEG] ERROR 1434 (ref. MPEG Systems 2.4.4.2 | 2.5.3.6) :

PES_packet P-STD-buffer size is ‘value’ bytes > system_header P-STD buffer size bound (‘value’ bytes)
The P-STD_buffer_size from the PES_packet_header in the Packet is larger than the P-STD_buffer_size specified by the system header.

>>> [MPEG] ODDITY 1435 :

PES_packet P-STD buffer size 0 specified !
PES_packet with the size ‘0’ can only be used as some form of stuffing.

>>> [MPEG] ERROR 1437 (ref. MPEG Systems 2.4.6 | 2.7.9) :

PES P-STD_buffer_size is ‘value’ bytes, should be <= ‘value’ for a CSPS video stream
with bitrate ‘value’ bits/sec and a VBV buffer of ‘value’ bytes.

This error is only reported for Video PES_packets and only issued when a sequence header is found. The P-STD_buffer_size specified an invalid value. Valid values are calculated according:

$$\begin{aligned} BS_{vbv} &= vbv_buffer\ size \\ BS_{add} &= \text{MAX}(6144, R_{v\ max} * 0.001) \end{aligned}$$

$R_{v\ max}$ is the maximum video bitrate of the ES.

P-STD_buffer_size for video <= BS_{vbv} + BS_{add}.

>>> [MPEG] ERROR 1440 (ref. MPEG Systems 2.4.5.4 | 2.7.5) :

‘packet type’ PES_Packet ‘number’ contains timestamp(s), no AU commences in it
A PTS may only be present in a Video or Audio elementary stream PES packet header if the first byte of a picture start code (Video ES) or the first byte of an Audio access unit is contained in the PES_packet.

>>> [MPEG] ERROR 1442 (ref. MPEG Systems 2.4.5.4 | 2.4.3.7) :

This Audio PES_packet has a decoding timestamp
A PES_packet header containing Audio elementary data is not allowed to contain a DTS.

>>> [MPEG] ERROR 1443 (ref. MPEG Systems 2.4.5.4 | 2.7.5) :

Video PES_Packet ‘number’ contains ‘no|no PTS, but contains a’ DTS



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This error is reported in these two instances:

- The PES_header specifies a DTS, but the ES contains MPEG-1 Video and the picture that starts in the current PES_packet has a picture_type ‘D’.
- The PES_header specified a DTS, but not a PTS.

>>> [MPEG] ERROR 1444 (ref. MPEG Systems 2.4.5.4 | 2.7.5) :

‘DTS|PTS’ of ‘packet type’ PES_Packet ‘number’ is ‘time string’, should be ‘time string’

This error is reported when the decoding_time for the next AU does not correspond to the PTS or DTS of the PES_packet.

>>> [MPEG] ERROR 1445 (ref. MPEG Systems 2.4.5.4 | 2.7.5) :

‘picture position’ I/P picture’s PTS - DTS offset is ‘value’, should be ‘value’

Checks if the decoding time of the first, current, or previous I/P picture is correct.

>>> [MPEG] ERROR 1446 (ref. MPEG Systems 2.4.5.4 | 2.7.5) :

PTS and DTS are identical (‘time string’), should be different

The PTS and the DTS cannot be equal. This would mean that the decoding of the AU would happen instantly.

>>> [MPEG] ERROR 1447 (ref. MPEG Systems 2.4.5.3 | 2.7.4) :

‘packet type’ PES_Packet PTS difference with previous PTS is ‘time string’,
should be <= 0.7 seconds or 63000 ticks

>>> [MPEG] ERROR 1448 (ref. MPEG Systems 2.4.5.1 | 2.5.2.3) :

PES STD buffer underflow at decoding time ‘time string’ [msec] of AU ‘number’ (‘number’ bytes)

This error reports that, according to the STD buffer calculations, one of these errors occurred:

- The AU due for removal is larger than the remaining STD buffer contents
- The size of the AU due for removal is not yet known (because the end of the AU had not been received in the stream)

>>> [MPEG] ERROR 1449 (ref. MPEG Systems 2.4.5.1 | 2.5.2.3) :

PES STD buffer overflow at decoding time ‘time string’ [msec] of AU ‘number’ (‘number’ bytes, buffer size ‘value’)

This error reports that, according to the STD buffer calculations, the payload of the PES_packet added to the STD buffer contents will cause an STD buffer contents larger than the allowed STD buffer size. The error reports this fact, but the PES_packet payload is still being added to the STD buffer contents. This error could be due to erroneous PTS/DTS values or it could be an encoding problem.

>>> [MPEG] ERROR 1450 (ref. MPEG Systems 2.4.5.1 | 2.5.2.3) :

First byte of AU in ‘packet type’ PES_packet ‘number’ arrives at ‘time string’ or ‘number’ ticks after its decoding time ‘time string’.

The decoding time for the AU mentioned in the error has already past, but the first byte was just received. This could result in some decoding problems and associated Audio or visual errors.

>>> [MPEG] ERROR 1451 (ref. MPEG Systems 2.4.5.1 | 2.5.2.3) :

First byte of AU in ‘packet type’ PES_packet ‘number’ arrives at ‘time string’ or ‘time string’ before its decoding time ‘time string’, which is more than the allowed ‘number’ second (‘number’ ticks)

Data from any AU is only allowed to remain in the STD buffer for a limited period. The first byte of the AU mentioned in this error was received more than that limited period before it should be decoded, meaning data would have to stay in the STD buffer for too long. The period is shown in the following table:

AU	time (sec)
still picture	60
other	1

>>> [MPEG] ERROR 1460 (ref. MPEG Systems 2.4.4.3 | 2.4.3.7) :
 PES_packet padding byte ‘number’ is ‘hexadecimal value’, should be 0xFF
 All padding bytes should be coded as ‘0xFF’.

4.3.1.4 **MPEG Sequence header checks**

>>> [MPEG] ERROR 1500 :
 Video sequence (‘number’) in ‘stream type’ ‘hexadecimal stream ID’ is not properly terminated,
 e.g. missing sequence_end_code.
 No sequence_end_code found before the end of the video ES.

>>> [MPEG] SYNTAX ERROR 1502 (ref. MPEG Video 2.4.2.3 | 6.2.2) :
 ‘code type string’ expected
 This error is reported when the parser expect one of these codes:

- Sequence header start code
- Extension header start code
- User_data start code
- Group of Pictures header start code
- Picture header start code
- Sequence_end_code

>>> [MPEG] SYNTAX ERROR 1503 (ref. MPEG Video 2.4.3.2 | 6.3.3) :
 Sequence_header marker bit is 0
 All marker_bits in the sequence_header should be coded as ‘1’.

>>> [MPEG] SYNTAX ERROR 1504 (ref. MPEG Video 2.4.2.3 | 6.2.2) :
 Sequence_header_code expected
 After parsing the last token of the previous picture, a new Sequence_header must be decoded in the Video ES, but the Sequence_header start code was not found in the PES_packet payload following the last token of the previous picture.

>>> [MPEG] SYNTAX ERROR 1505 (ref. MPEG Video 2.4.2.3 | 6.2.2) :
 Sequence_header extension, user_data, group_start_code (or picture_start_code, MPEG-2 only) expected
 At this point in the parsing process, only these start codes are allowed.

>>> [MPEG] SYNTAX ERROR 1506 (ref. MPEG Video 2.4.2.3 | 6.2.2) :
 Sequence_header user_data or group_start_code expected
 At this point in the parsing process, only these start codes are allowed.

>>> [MPEG] SYNTAX ERROR 1507 (ref. MPEG Video 2.4.2.3 | 6.2.2) :
 Expecting group/sequence_header/sequence_end start code
 At this point in the parsing process, only these start codes are allowed.

>>> [MPEG] ERROR 1510 (ref. MPEG Video ? | 6.3.3) :
 Sequence_header horizontal_size is 0
 A horizontal_size of ‘0’ is not allowed, a picture cannot be ‘0’ pixels wide. The horizontal_size should be larger than ‘0’.

>>> [MPEG] ERROR 1511 (ref. MPEG-1 Video 2.4.3.2) :
 Sequence_header horizontal_size is ‘value’, should be <= 768
 when the constrained_parameters_flag is set.
 In a constrained parameter stream, the horizontal_size should be less than, or equal to 768.



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>>> [MPEG] ERROR 1513 (ref. MPEG Video 2.4.1 | 6.1.1.6) :

Sequence_header horizontal_size is ‘value’, previously defined to be ‘value’
All of the fields in repeated sequence_headers shall have the same values as the first sequence_header in the stream, excluding the fields defining the quantisation matrices.

>>> [MPEG] ERROR 1514 (ref. MPEG Video ? | 6.3.3) :

Sequence_header vertical_size is 0
A vertical_size of ‘0’ is not allowed, a picture cannot be ‘0’ pixels high. The vertical_size should be larger than ‘0’.

>>> [MPEG] ERROR 1515 (ref. MPEG-1 Video 2.4.3.2) :

Sequence_header vertical_size is ‘value’, should be <= 576
when the constrained_parameters_flag is set.

In a constrained parameter stream, the vertical_size should be less than, or equal to 576.

>>> [MPEG] ERROR 1517 (ref. MPEG Video 2.4.1 | 6.1.1.6) :

Sequence_header vertical_size is ‘value’, previously defined to be ‘value’
All of the fields in repeated sequence_headers shall have the same values as the first sequence_header in the stream, excluding the fields defining the quantisation matrices.

>>> [MPEG] ERROR 1518 (ref. MPEG-1 Video 2.4.3.2) :

Picture area is ‘value’ macroblocks, should be <= 396
when the constrained_parameters_flag is set.

In a constrained parameter stream, the picture area should be less than, or equal to 396.

>>> [MPEG] ERROR 1521 (ref. MPEG-1 Video 2.4.3.2) :

Product of picture area, and picture rate, is ‘value’, should be <= 9900
when the constrained_parameters_flag is set.

In a constrained parameter stream, the product of the picture area and the picture rate should be less than, or equal to 396 * 25 (equals 9900).

>>> [MPEG] ERROR 1530 (ref. MPEG Video 2.4.3.2 | Tab.6-3) :

Sequence_header aspect_ratio field has forbidden value 0
The aspect_ratio value ‘0000b’ is a forbidden value and shall not be used

>>> [MPEG] ERROR 1531 (ref. MPEG Video 2.4.3.2 | Tab.6-3 and Tab. 8-5) :

Sequence_header aspect_ratio has reserved value ‘value’, should be within range ‘minimum value’ ... ‘maximum value’

The aspect_ratio value may only specify a value in the reported range. This range is specified as:

	minimum value	maximum value
MPEG-1	1	14 (0xE)
MPEG-2	1	4

>>> [MPEG] ERROR 1532 (ref. MPEG Video 2.4.1 | 6.1.1.6) :

Sequence_header pixel aspect ratio is ‘value’, previously defined to be ‘value’
All of the fields in repeated sequence_headers shall have the same values as the first sequence_header in the stream, excluding the fields defining the quantisation matrices.

>>> [MPEG] ERROR 1533 (ref. MPEG Video 2.4.3.2 | Tab.6-4) :

Sequence_header : illegal frame_rate_code ‘value’
The frame_rate_code must specify a value between ‘0001b’ and ‘1000b’.

>>> [MPEG] ERROR 1534 (ref. MPEG-1 Video 2.4.3.2) :

Sequence_header frame_rate is ‘value’ Hz, should be <= 30
when the constrained_parameters_flag is set.

In a constrained parameter stream, the frame_rate should be less than, or equal to 30.

>>> [MPEG] ERROR 1536 (ref. MPEG Video 2.4.1 | 6.1.1.6) :

Sequence_header frame_rate is ‘value’, previously defined to be ‘value’

All of the fields in repeated sequence_headers shall have the same values as the first sequence_header in the stream, excluding the fields defining the quantisation matrices.

>>> [MPEG] ERROR 1537 (ref. MPEG Video 2.4.3.2 | 6.3.3) :

Sequence_header bit_rate is 0

The bit_rate field should specify a bitrate of more than 0 bit/sec.

>>> [MPEG] ERROR 1542 (ref. MPEG-1 Video 2.4.3.2) :

Sequence_header bit_rate is ‘value’, should be fixed and ≤ 1.856 Mbit/s

when the constrained_parameters_flag is set.

In a constrained parameter stream, the bit_rate should be fixed and less than, or equal to 1.836 Mbit/sec.

>>> [MPEG] ERROR 1543 (ref. MPEG Video 2.4.1 | 6.1.1.6) :

Sequence_header bit_rate is ‘value’, previously defined to be ‘value’

All of the fields in repeated sequence_headers shall have the same values as the first sequence_header in the stream, excluding the fields defining the quantisation matrices.

>>> [MPEG] ERROR 1544 (ref. MPEG-1 Video 2.4.3.2) :

Sequence_header buffer size is ‘value’ Kbytes, should be ≤ 40

when the constrained_parameters_flag is set.

In a constrained parameter stream, the buffer size should be less than, or equal to 40 Kbytes.

>>> [MPEG] ERROR 1547 (ref. MPEG Video 2.4.1 | 6.1.1.6) :

Sequence_header buffer size is ‘value’ Kbytes, previously defined to be ‘value’ Kbytes

All of the fields in repeated sequence_headers shall have the same values as the first sequence_header in the stream, excluding the fields defining the quantisation matrices.

>>> [MPEG] ERROR 1548 (ref. MPEG-1 Video 2.4.1) :

Sequence_header constrained_parameters_flag is ‘value’, previously defined to be ‘value’

All of the fields in repeated sequence_headers shall have the same values as the first sequence_header in the stream, excluding the fields defining the quantisation matrices.

>>> [MPEG] ERROR 1550 (ref. MPEG Video 2.4.3.2 | 6.3.11) :

Sequence_header intra_quantiser_matrix[‘index’] is 0.

The intra_quantiser_matrix value ‘0’ is forbidden and must be in range [1..255].

>>> [MPEG] ERROR 1551 (ref. MPEG Video 2.4.3.2 | 6.3.11) :

Sequence_header intra_quantiser_matrix[0] is ‘value’, should be 8

The first intra_quantiser_matrix should always be ‘8’.

>>> [MPEG] ERROR 1552 (ref. MPEG Video 2.4.3.2 | 6.3.11) :

Sequence_header non_intra_quantiser_matrix[‘index’] is 0

The non_intra_quantiser_matrix shall not specify the value ‘0’.

>>> [MPEG] ERROR 1553 (ref. MPEG Video 2.4.3.2 | 6.3.4.1) :

Sequence_header’s user_data contains ‘number’ consecutive zero bits

The user_data contained enough consecutive ‘0’ bits that an emulation of a start code could occur. The user_data is not allowed to emulate a start code, therefore the user_data shall be coded in such a way that more than 23 consecutive ‘0’ bits do not occur.



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>>> [MPEG] ERROR 1599 (ref. MPEG-1 Video 2.4.3.2) :
Sequence_header contains ‘number’ bytes of sequence_extension_data

4.3.1.5 MPEG GOP checks

>>> [MPEG] SYNTAX ERROR 1621 (ref. MPEG Video 2.4.2.4 | 6.2.2.6) :
GOP next_start_code() failed

The parser could not find a valid GOP start code in the stream at the position reported. This could indicate a problem in the preceding GOP. The parser will recover to the next valid start code.

>>> [MPEG] ERROR 1622 (ref. MPEG Video 2.4.3.3 | 6.3.8) :
GOP marker_bit in time_code is 0
All marker_bits should be coded as ‘1’.

>>> [MPEG] SYNTAX ERROR 1623 (ref. MPEG Video 2.4.2.4 | 6.2.2.6) :
GOP extension, user_data or picture_start_code expected

The parser could not find any of the mentioned start codes in the stream at the position reported. At this position, only the reported start codes may occur. The parser will recover to the next valid start code.

>>> [MPEG] SYNTAX ERROR 1624 (ref. MPEG Video 2.4.2.4 | 6.2.2.6) :
GOP user_data or picture_start_code expected

The parser could not find any of the mentioned start codes in the stream at the position reported. At this position, only the reported start codes may occur. The parser will recover to the next valid start code.

>>> [MPEG] SYNTAX ERROR 1625 (ref. MPEG Video 2.4.2.4 | 6.2.2.6) :
Expecting picture/group/sequence_header/sequence_end start code

The parser could not find any of the mentioned start codes in the stream at the position reported. At this position, one of the reported start codes must occur. The parser will recover to the next valid start code.

>>> [MPEG] ERROR 1630 (ref. MPEG Video 2.4.3.3 | 6.3.8) :
GOP drop_frame_flag is 1, picture rate is ‘value’

The drop_frame_flag may only be set to ‘1’ when the frame rate specified 29.97 Hz.

>>> [MPEG] ERROR 1631 (ref. MPEG Video 2.4.3.3 | 6.3.8) :
GOP time_code_hours is ‘value’, should be in 0..23

>>> [MPEG] ERROR 1632 (ref. MPEG Video 2.4.3.3 | 6.3.8) :
GOP time_code_minutes is ‘value’, should be in 0..59

>>> [MPEG] ERROR 1633 (ref. MPEG Video 2.4.3.3 | 6.3.8) :
GOP time_code_seconds is ‘value’, should be in 0..59

>>> [MPEG] ERROR 1634 (ref. MPEG Video 2.4.3.3 | 6.3.8) :
GOP time_code_pictures is ‘value’, should be in ‘minimum value’..’maximum value’

The GOP time_code_pictures must specify a value within the reported range. The range is limited at the upper end by the frame_rate, rounded to the nearest integral number of pictures per second. The lower limit is normally ‘0’, but when the GOP specified the drop_frame_flag value ‘1’ AND the time_code_minutes does not equal ‘0’, ‘10’, ‘20’, ‘30’, ‘40’, or ‘50’, the minimum value is ‘2’.

>>> [MPEG] ODDITY 1635 (ref. MPEG Video 2.4.3.3 | 6.3.8) :
GOP time_code is ‘timecode string’, expected ‘timecode string’

The GOP timecode should contain no gaps, but the calculated GOP time_code differs from the encoded time_code.

>>> [MPEG] ODDITY 1636 (ref. MPEG Video 2.4.3.3 | 6.3.8) :

 GOP closed_gop and broken_link both 1

The closed_gop flag is used to indicate the nature of the predictions used in the first consecutive B-pictures immediately following the first coded I-frame following the GOP header. A value of '1' indicates that these B-pictures are encoded using only backward prediction or intra coding. This cannot coincide with the broken_link flag, which is used to indicate that the first consecutive B-pictures immediately following the first coded I-frame following the GOP header may not be correctly decoded because the reference frame which is used for prediction is not available. Thus B-pictures with the closed_gop flag set to '1' can always be correctly decoded, negating the broken_link flag.

>>> [MPEG] ERROR 1640 (ref. MPEG Video 2.4.3.3 | 6.3.1) :

 GOP contains 'number' bytes of group_extension_data

 However extension_data is not allowed following a GOP_header.

>>> [MPEG] ERROR 1641 (ref. MPEG Video 2.4.3.3 | 6.3.4.1) :

 GOP's user_data contains 'number' consecutive zero bits

The user_data contained enough consecutive '0' bits that an emulation of a start code could occur. The user_data is not allowed to emulate a start code, therefore the user_data shall be coded in such a way that more than 23 consecutive '0' bits do not occur.

>>> [MPEG] ERROR 1642 (ref. MPEG Video 2.4.1 | Compl 9.2.1.3) :

 GOP ends with too few B-pictures

 There are less B-pictures than expected in the current GOP.

4.3.1.6 MPEG Picture checks

>>> [MPEG] SYNTAX ERROR 1650 (ref. MPEG Video 2.4.2.5 | 6.2.3) :

 Picture next_start_code() failed

The parser could not find a valid picture start code in the stream at the position reported. This could indicate a problem in the preceding picture. The parser will recover to the next valid start code.

>>> [MPEG] SYNTAX ERROR 1653 (ref. MPEG Video 2.4.2.5 | 6.2.3) :

 Picture extension, user_data or slice_start_code expected

The parser could not find any of the mentioned start codes in the stream at the position reported. At this position, only the reported start codes may occur. The parser will recover to the next valid start code.

>>> [MPEG] SYNTAX ERROR 1654 (ref. MPEG Video 2.4.2.5 | 6.2.3) :

 Picture user_data or slice_start_code expected

The parser could not find any of the mentioned start codes in the stream at the position reported. At this position, only the reported start codes may occur. The parser will recover to the next valid start code.

>>> [MPEG] SYNTAX ERROR 1655 (ref. MPEG Video 2.4.2.5 | 6.2.3) :

 Picture slice_start_code expected

The parser could not find any of the mentioned start codes in the stream at the position reported. At this position, only the reported start codes may occur. The parser will recover to the next valid start code.

>>> [MPEG] SYNTAX ERROR 1656 (ref. MPEG Video 2.4.2.5 | 6.2.3) :

 Expecting slice/picture/group/sequence_header/sequence_end start code

The parser could not find any of the mentioned start codes in the stream at the position reported. At this position, one of the reported start codes must occur. The parser will recover to the next valid start code.



>>> [MPEG] ERROR 1661 (ref. MPEG Video 2.4.3.4 | 6.3.9) :

Picture temporal_reference is ‘value’, should be ‘number’

This error is reported in these three distinct cases:

- The temporal_reference of the reported picture must be the same as the previous, because the picture is coded as two field pictures.
- The temporal_reference of the reported picture must be incremented by 1 modulo 1024 over the previous picture
- The temporal_reference of the reported picture must be ‘0’, because it follows a GOP header

>>> [MPEG] ERROR 1662 (ref. MPEG Video 2.4.3.4 | 6.3.9) :

Picture invalid picture_coding_type ‘number’ (‘picture type string’)

The picture type should describe a value as stated in this table:

	minimum range	maximum range
MPEG1	001 (I)	100 (D)
MPEG2	001 (I)	011 (B)

>>> [MPEG] ERROR 1663 (ref. MPEG-1 Video 2.4.3.4) :

Combination D- and non-D pictures in same sequence

>>> [MPEG] ERROR 1666 (ref. MPEG Video 2.4.1 | 6.1.1.7) :

First picture in GOP has type ‘picture type string’, should be an I-picture

>>> [MPEG] ERROR 1667 (ref. MPEG Video 2.4.3.4 | 6.3.9) :

Picture has type ‘picture type string’, temporal reference of picture ‘value’ indicates it should be B
This error is generated when a picture’s encoded temporal reference value does not match the coding sequence order, e.g. after coding an I-P-picture pair, the number of B-pictures that should follow can be derived from the temporal reference value difference of the I- and P-picture. If there are more or less B-pictures encoded, this error is generated.

>>> [MPEG] ERROR 1670 (ref. MPEG-1 Video 2.4.3.4) :

Picture vbv_delay is ‘value’, should be 0xFFFF (variable bit_rate)

In a variable bit rate Video stream, all vbv_delay values should be encoded with the value ‘0xFFFF’.

>>> [MPEG] ERROR 1671 (ref. MPEG-1 Video 2.4.3.4) :

Picture forward_f_code is 0

The forward_f_code field specified the reserved value ‘0’.

>>> [MPEG] ERROR 1672 (ref. MPEG-1 Video 2.4.3.2) :

Picture forward_f_code ‘value’ exceeds ‘4’

when the constrained_parameters_flag is set

>>> [MPEG] ERROR 1674 (ref. MPEG-1 Video 2.4.3.4) :

Picture backward_f_code is 0

The backward_f_code field specified the reserved value ‘0’.

>>> [MPEG] ERROR 1675 (ref. MPEG-1 Video 2.4.3.2) :

Picture backward_f_code ‘value’ exceeds ‘4’

when the constrained_parameters_flag is set

>>> [MPEG] ERROR 1680 (ref. MPEG Video 2.4.3.4 | 6.3.9) :

Picture contains ‘number’ bytes of extra_information_picture data

No extra_information_picture data may be encoded in the Picture header

>>> [MPEG] ERROR 1681 (ref. MPEG-1 Video 2.4.3.4) :

Picture contains ‘number’ bytes of group_extension_data
No group_extension_data may be encoded in the Picture header

>>> [MPEG] ERROR 1682 (ref. MPEG Video 2.4.3.4 | 6.3.4.1) :

Picture's user_data contains ‘number’ consecutive zero bits
The user_data contained enough consecutive ‘0’ bits that an emulation of a start code could occur. The user_data is not allowed to emulate a start code, therefore the user_data shall be coded in such a way that more than 23 consecutive ‘0’ bits do not occur.

>>> [MPEG] ERROR 1690 (ref. MPEG Video 2-C.1 | Ann.C) :

VBV buffer underflow for picture ‘number’ (‘number’ bytes, m=’number’)
The VBV buffer model detected an underflow in the VBV buffer model.

>>> [MPEG] ERROR 1691 (ref. MPEG Video 2-C.1 | Ann.C) :

VBV buffer overflow for picture ‘number’ (‘number’ bytes, m=’number’)
The VBV buffer model detected an overflow in the VBV buffer model.

>>> [MPEG] ERROR 1692 (ref. MPEG-1 Video 2.4.3.4) :

vbv_delay for picture ‘number’ is ‘value’, should be in range ‘minimum value’ .. ‘maximum value’

>>> [MPEG] ERROR 1695 (ref. MPEG Video C.3.1) :

Decoding time of picture ‘number’, is before it has been received completely.
The end of the reported picture was not found before the decoding time. This would mean that the decoder will be unable to decode the picture completely and display it without distortions.

>>> [MPEG] ERROR 1696 (ref. MPEG Video C.3.1) :

Vbv_delay value ‘value’ incorrect: leads to negative or zero time to receive all bits of previous picture

>>> [MPEG] ERROR 1697 (ref. MPEG Video C.3.1) :

Actual bit_rate ‘value’ Mbit/s exceeds maximum bit_rate ‘maximum value’ Mbit/s
as specified in sequence header and sequence extension

4.3.1.7 **MPEG Slice checks**

>>> [MPEG] ERROR 1751 (ref. MPEG Video 2.4.3.5 | 6.3.16) :

Slice vertical position ‘value’ exceeds picture height
The vertical position of the slice must specify a position within the picture boundaries.

>>> [MPEG] ERROR 1752 (ref. MPEG Video 2.4.3.5 | 6.3.16) :

Slice quantizer_scale_code has the forbidden value 0

>>> [MPEG] ERROR 1753 (ref. MPEG Video 2.4.3.5 | 6.3.16) :

Slice contains extra_information_slice data
No extra_information_slice may be encoded in the Slice header.

>>> [MPEG] SYNTAX ERROR 1754 (ref. MPEG Video 2.4.2.6 | 6.2.4) :

Expecting slice-start-code etc.
The parser could not find the mentioned start code in the stream at the position reported. At this position, the reported start code must occur. The parser will recover to the next valid start code.



>>> [MPEG] SYNTAX ERROR 1755 (ref. MPEG Video 2.4.2.6 | 6.2.4) :

Illegal next_start_code()

The parser did not find any valid start code in the stream, this error is normally preceded by SYNTAX ERROR 1754.

4.3.1.8 **MPEG Macroblock checks**

>>> [MPEG] SYNTAX ERROR 1770 (ref. MPEG-1 Video 2.4.3.6) :

end_of_macroblock field is 0

>>> [MPEG] SYNTAX ERROR 1771 (ref. MPEG Video 2-B.1 | B.1) :

Invalid macroblock_address_increment

>>> [MPEG] ERROR 1772 (ref. MPEG Video 2.4.4.5 | Compl. 9.2.1.5) :

Macroblock ‘number’ not intra-coded in 132 P-pictures

Each macroblock should be intra-coded at least once per every 132 times it is coded in a P-picture without intervening I-picture.

>>> [MPEG] ERROR 1773 (ref. MPEG Video 2.4.1 | 6.3.17) :

Macroblock number ‘number’ outside picture

The macroblock absolute position derived from the macroblock_address falls outside the specified picture dimensions.

>>> [MPEG] ERROR 1774 (ref. MPEG Video 2.4.3.5 | 6.3.17) :

Macroblock address increment ‘value’ exceeds picture width

The macroblock absolute position derived from the macroblock_address falls outside the specified picture dimensions.

>>> [MPEG] ERROR 1775 (ref. MPEG Video 2.4.1 | 6.3.17) :

First macroblock in picture has number ‘value’.

The first macroblock should not be skipped and must have number ‘1’.

>>> [MPEG] ERROR 1776 (ref. MPEG Video 2.4.1 | 6.3.17) :

Inter-slice gap between macroblock ‘number’ and ‘number’

Every slice should be encoded.

>>> [MPEG] ERROR 1777 (ref. MPEG Video 2.4.4.4 | 6.3.17) :

Macroblock(s) skipped between ‘number’ (intra) and ‘number’

In a B-picture there shall be no skipped macroblocks immediately following an intra_coded macroblock.

>>> [MPEG] SYNTAX ERROR 1778 (ref. MPEG Video 2-B.2 | B.2) :

Invalid macroblock_type

>>> [MPEG] ERROR 1779 (ref. MPEG Video 2.4.3.3 | 6.3.8) :

GOP closed, but macroblock refers to previous GOP

In a closed GOP (closed_gop == 1) no backward prediction (referencing previous picture data) is allowed for the B-pictures immediately following the first I-picture in the GOP.

>>> [MPEG] ERROR 1780 (ref. MPEG Video 2.4.3.3 | 6.3.8) :

GOP first in sequence, broken_link not set, but macroblock refers to previous GOP

In a closed GOP (closed_gop == 1) no backward prediction (referencing previous picture data) is allowed for the B-pictures immediately following the first I-picture in the GOP.

>>> [MPEG] ERROR 1781 (ref. MPEG Video 2.4.3.6 | Tab.7-6) :
 Macroblock quantizer_scale_code is 0

>>> [MPEG] SYNTAX ERROR 1782 (ref. MPEG Video 2-B.4 | B.4) :
 Macroblock illegal ‘error string’

This error is reported for illegal use of:

- motion_horizontal_forward_code
- motion_vertical_forward_code
- motion_horizontal_backward_code
- motion_vertical_backward_code
- motion_code
- dmvector

>>> [MPEG] ERROR 1783 (ref. MPEG Video 2.4.4.2 | 7.6.3) :

Reconstruction of ‘vertical|horizontal’ component of ‘first|second|first dual prime|second dual prime’ ‘forward|backward’ vector for macroblock ‘number’ failed: reconstructed vector component out of allowable motion vector range

The allowable motion vector range is described in Table 7-8.

>>> [MPEG] ERROR 1784 (ref. MPEG Video 2.4.4.2 | 7.6.3.8) :

Horizontal component ‘number’ of ‘first|second|first dual prime|second dual prime’ ‘forward|backward’ vector for macroblock ‘number’ out of picture boundaries

>>> [MPEG] SYNTAX ERROR 1785 (ref. MPEG Video 2-B.3 | B.3) :

Macroblock illegal coded_block_pattern

>>> [MPEG] ERROR 1786 (ref. MPEG Video 2.4.4.2 | 7.6.3.8) :

Vertical component ‘number’ of ‘first|second|first dual prime|second dual prime’ ‘forward|backward’ vector for macroblock ‘number’ out of picture boundaries

4.3.1.9 MPEG Block checks

>>> [MPEG] SYNTAX ERROR 1801 (ref. MPEG Video 2-B.5 | B.5) :
 Block invalid ‘dct_dc_size_luminance | dct_dc_size_chrominance’

>>> [MPEG] SYNTAX ERROR 1802 (ref. MPEG Video 2-B.5 | B.5) :
 Block invalid ‘dct_coeff_first | dct_coeff_next’
 VLC decoding fails for the indicated DCT coefficient.

>>> [MPEG] ERROR 1803 (ref. MPEG Video 2.4.3.7 | 7.2) :
 Block index is ‘number’

Decoding error occurred causing the block index value to exceed 63.

>>> [MPEG] ERROR 1804 (ref. MPEG Video 2-B.5 | B.5) :
 Block invalid DCT escape code



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4.3.1.10 MPEG Audio checks

>>> [MPEG] SYNTAX ERROR 1851 :

 Audio sequence does not start with a syncword

This error is generated for the first audio frame, in two distinct cases:

- The audio parser finished parsing the base frame, but the next bytes in the stream are not the extension syncword.
- The audio parser is about to start parsing the base frame, but the next bytes in the stream are not the baseframe syncword.

>>> [MPEG] SYNTAX ERROR 1852 :

 No syncword where frame length indicates it should be

This error is generated, in two distinct cases:

- The audio parser finished parsing the base frame, but the next bytes in the stream are not the extension syncword.
- The audio parser is about to start parsing the base frame, but the next bytes in the stream are not the baseframe syncword.

This error is basically identical to ERROR 1851, with the exception that this error is generated when the check fails for an audio frame other than the first in the PES.

>>> [MPEG] INFORMATION 1860 :

 Recovering ... ‘number’ bytes skipped.

The audio parser could not parse the previous audio frame(s) correctly and skipped the number of bytes indicated to a valid syncword. Normal parsing is resumed.

>>> [MPEG] ERROR 1870 :

 Audio frame not complete

More base frames were found in the ES than there were extension frames, making the last baseframe incomplete.

>>> [MPEG] SYNTAX ERROR 1871 :

 Amount of audio information exceeds frame length

This error reports that the amount of data in the frame does not correspond to the frame_length field. This is usually due to the audio parser assuming MPEG-2, while the stream is encoded as MPEG-1. The bytes following the base frame are interpreted as the multi-channel extension. This error can also occur due to erroneous flags in the stream.

>>> [MPEG] SYNTAX ERROR 1891 (ref. MPEG Audio 2.4.2.2) :

 Audio frame ID is 0

The Audio ID field should be coded as ‘1’.

>>> [MPEG] ERROR 1892 (ref. MPEG Audio 2.4.2.2) :

 Audio frame layer invalid

The frame layer should not describe the reserved value ‘0’.

>>> [MPEG] ERROR 1895 (ref. MPEG Audio 2.4.2.2) :

 Audio : Forbidden bitrate

The bitrate field must be larger than the value ‘0xF’.

>>> [MPEG] ERROR 1896 (ref. MPEG Audio 2.4.2.2) :

 Audio : Combination layer II, bitrate ‘value’ Kbit/s and ‘mode type string’ mode
For layer II MPEG audio, these bitrate/mode combinations are allowed:

Mode	allowed bitrates				
Single channel	32	48	56	80	Kbit/s
>Single channel	224	256	320	384	Kbit/s

>>> [MPEG] ERROR 1899 (ref. MPEG Audio 2.4.2.2) :

 Audio : Invalid sampling_frequency
The sampling_frequency should not describe the reserved value ‘0x3’.

>>> [MPEG] ERROR 1901 (ref. MPEG Audio 2.4.2.2) :

 Padding bit should have been ‘value’

>>> [MPEG] ERROR 1903 (ref. MPEG Audio 2.4.2.2) :

 Audio : Invalid emphasis
The emphasis should not describe the reserved value ‘0x2’.

>>> [MPEG] ERROR 1910 (ref. MPEG Audio 2.4.3.1 & MPEG-2 Audio 2.5.2.10 & 2.5.2.14) :

 CRC error in ‘frame type string’ audio data: calculated value ‘hexadecimal CRC value’, value in ‘frame type string’ ‘hexadecimal CRC value’

This error is generated when the calculated CRC does not correspond with the CRC found encoded in the stream for these locations of the CRC:

- Multichannel CRC
- Base frame CRC
- Extension frame CRC
- Application specific CRC

>>> [MPEG] ERROR 1911 (ref. MPEG Audio 3-B.1) :

 Scalefactor’index’ refers to index 63
A scalefactor specified a reserved value ‘63’. Together with the type of the scalefactor is also reported the index, which indicates the channel, sub-band and scalefactor number, depending on the scalefactor type.

>>> [MPEG] ERROR 1912 (ref. MPEG-2 Compliance 2.5.2.1.2 & 2.5.2.1.3 & 2.5.2.2.2) :

 Sample’index’ value ‘value’ outside valid range [0, ‘maximum value’]>
The reported sample or sample_code value is not within the valid range. The range is reported by the error, with the upper limit not included in the range of valid values. Together with the type of the sample is also reported the index, which indicates the channel, group and sub-band, depending on the sample type.

>>> [MPEG] ERROR 1913 (ref. MPEG-2 Compliance 2.5.2.1.2) :

 allocation’index’ illegal value 0xF
An allocation specified a reserved value ‘0xF’. Also reported is the index, which indicates the channel and sub-band of the allocation.



4.3.2 MPEG-2 Checks

4.3.2.1 MPEG-2 PS checks

>>> [MPEG-2] ERROR 2301 (ref. MPEG-2 Systems various) :

Marker_bit is 0

All marker bits should be coded as ‘1’.

>>> [MPEG-2] SYNTAX ERROR 2308 (ref. MPEG-2 Systems 2.5.3.4) :

Pack_header marker 01 expected

>>> [MPEG-2] SYNTAX ERROR 2310 (ref. MPEG-2 Systems 2.5.3.4) :

Pack : specified stuffing length ‘value’ exceeds the pack header size

The stuffing should fit within the Pack header. In this case, the stuffing length exceeds the pack header, which could be caused by erroneous flags in the pack header, causing the parser to parse too much data.

>>> [MPEG-2] ERROR 2311 (ref. MPEG-2 Systems 2.5.3.4) :

Pack stuffing length should be < 7, is ‘value’

The minimum length of stuffing in a Pack is 7 bytes.

>>> [MPEG-2] SYNTAX ERROR 2312 (ref. MPEG-2 Systems 2.5.3.4) :

Pack stuffing byte ‘number’ should be 0xFF, is ‘hexadecimal value’

All stuffing bytes should be coded as ‘0xFF’. This error could point out that the bytes currently being parsed as stuffing, could mean something different altogether, i.e. meaningful data.

>>> [MPEG-2] ERROR 2331 (ref. MPEG-2 Systems 2.5.3.6) :

System_header reserved_byte is ‘hexadecimal value’, should be 0x7F

4.3.2.2 MPEG-2 PES checks

>>> [MPEG-2] ERROR 2401 (ref. MPEG-2 Systems various) :

Marker_bit is 0, should be 1

All marker bits should be coded as ‘1’.

>>> [MPEG-2] INFORMATION 2410 :

Gap in ‘packet type string’ sequence of ‘number’ seconds.

This error reports a gap in the timestamps for the reported packet type. This error is generated at the start of:

- Picture header start
- Audio frame start
- Audio extension frame start
- Private-1 access unit start

The timestamp of the previous start of an AU increased with the duration of that AU must equal the timestamp of the AU that just started.

>>> [MPEG-2] SYNTAX ERROR 2420 (ref. MPEG-2 Systems 2.1.47) :

PES_packet ‘number’ reserved bits field is ‘hexadecimal value’; all bits should be 1

>>> [MPEG-2] SYNTAX ERROR 2421 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet starts with an illegal start_code_prefix : ‘hexadecimal value’

A start_code_prefix should always be ‘0x000001’.

>>> [MPEG-2] ERROR 2422 (ref. MPEG-2 Systems Tab.2-18) :

PES_packet stream_id 0xF9 illegal for a Program Stream

The use of stream_id 0xF9 (Ancillary stream) is not allowed in a Transport stream.

>>> [MPEG-2] ERROR 2423 (ref. MPEG-2 Systems Tab.2-18) :

PES_packet stream_id 'hexadecimal stream id' illegal for a Transport Stream

The use of stream_id 0xBC (Program stream map) and 0xFF (Program stream directory) is not allowed in a Transport stream.

>>> [MPEG-2] ERROR 2430 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet length 0 only allowed in Transport Streams

>>> [MPEG-2] ERROR 2431 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet length 0 only allowed in TS video streams (actual ID = 'hexadecimal stream id')

Only the PES_packet with a stream_id belonging to a video stream in a Transport stream, may specify a PES_packet length of 0 bytes.

>>> [MPEG-2] SYNTAX ERROR 2432 (ref. MPEG-2 Systems 2.4.3.6) :

PES_packet 2-bit marker is not '10'

>>> [MPEG-2] ODDITY 2433 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet data_alignment_indicator set in non-audio or -video stream

The data_alignment_indicator can only be used in an Audio or Video stream. This error reports the data_alignment_indicator is set to '1' in any other stream.

>>> [MPEG-2] ERROR 2434 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet data_alignment_indicator set : no valid PES_packet data alignment

The data_alignment_indicator is used to indicate that the PES_header is immediately followed by a video start code or audio syncword.

>>> [MPEG-2] ERROR 2435 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet data_alignment_indicator set : data alignment does not correspond with the descriptor specified 'alignment type string' alignment

The specification for PES_packet data alignment can be done at two places:

- The data_alignment_indicator from the PES_packet header.
- The alignment_type from the Data stream alignment descriptor (MPEG-2 Systems 2.6.10).

These two should agree, i.e. when the descriptor is present, the data_alignment_indicator in the PES_header must be set and another type of data alignment is found (e.g. An audio syncword is found immediately after the PES_header) then specified by the descriptor.

>>> [MPEG-2] ERROR 2436 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet data_alignment_indicator set : missing descriptor demands 'alignment type string' alignment
When the data_alignment_indicator is set in the PES_header, but no Data stream descriptor is present, an alignment_type of '01' is assumed, which is:

- Slice or video access unit alignment in case of a Video Packet
- Syncword alignment in case of an Audio Packet

This error is reported when some other form of data alignment is found.

>>> [MPEG-2] ERROR 2438 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet copyright flag set : no associated descriptor

This message is reported when the copyright flag is set to '1' in the PES_header, but a copyright descriptor, as described in MPEG-2 2.6.8, is not associated with the elementary stream which contains this PES packet.



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>>> [MPEG-2] ODDITY 2439 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet copyright flag not set : but a copyright descriptor exists

This message is reported when the copyright flag is set to '0' in the PES_header, but a copyright descriptor, as described in MPEG-2 2.6.8, is associated with the elementary stream which contains this PES packet. Since the value '0' for the copyright flag does not define whether the material is copyright protected or not, this message is reported as an oddity.

>>> [MPEG-2] ERROR 2440 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet forbidden PTS_DTS_flags setting '01'

>>> [MPEG-2] ERROR 2441 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet PES_header_data_length is 'value', should be at least 'value'

The minimum length of a PES_packet header depends on the flags that are set to '1' in the PES_packet header.

>>> [MPEG-2] ERROR 2442 (ref. MPEG-2 Systems 2.7.5) :

'packet type string' PES_Packet 'number' contains no PTS although first AU starts in it

The PES_packet header did not have a PTS encoded, but the PES_packet payload contains the start of an access unit. The start of an access unit must always be accompanied with a PTS in the PES_packet header.

>>> [MPEG-2] ERROR 2445 (ref. MPEG-2 Systems 2.4.3.7) :

DTS present in low-delay video sequence's PES_packet

For Presentation units in a low_delay Video stream, the PTS should be equal to the DTS, therefore the DTS should not be encoded in the PES_packet header, because according to MPEG-2 Systems 2.7.5, a DTS may only be encoded if the decoding time differs from the presentation time.

>>> [MPEG-2] ERROR 2446 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet : DTS present for B-picture

For B-Pictures in a Video stream, the PTS should be equal to the DTS, therefore the DTS should not be encoded in the PES_packet header, because according to MPEG-2 Systems 2.7.5, a DTS may only be encoded if the decoding time differs from the presentation time.

>>> [MPEG-2] ERROR 2447 (ref. MPEG-2 Systems 2.7.5) :

PES_packet 'number' : PTS missing for the first AU after an STD-buffer underflow
in a low_delay video sequence.

When low_delay is '1', a PTS shall be encoded for the first access unit after an STD buffer underflow

>>> [MPEG-2] INFORMATION 2448 (ref. MPEG-2 Systems 2.5.2.3) :

PES low_delay STD buffer underflow at decoding time 'time string' of AU 'number'

This error reports that, according to the low_delay STD buffer calculations, one of these errors occurred:

- The AU due for removal is larger than the remaining STD buffer contents
- The size of the AU due for removal is not yet known (because the end of the AU had not been received in the stream)

>>> [MPEG-2] ERROR 2450 (ref. MPEG-2 Systems 2.7.3) :

PES_packet difference between successive ESCR's is 'time string', should be < 0.7 seconds

An ESCR should be decoded in the PES_packet at intervals of at most 0.7 seconds.

>>> [MPEG-2] ERROR 2451 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet has forbidden ES_rate value 0

>>> [MPEG-2] ERROR 2452 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet has reserved trick_mode_control 'hexadecimal value'

The trick_mode_control field uses a reserved value.

>>> [MPEG-2] ERROR 2453 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet has reserved field_id ‘hexadecimal value’ in its trick_mode data
The field_id field from the trick_mode uses a reserved value.

>>> [MPEG-2] ERROR 2454 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet intra_slice_refresh=0 and macroblocks are missing
The intra_slice_refresh value ‘0’ specifies that there are no missing macroblocks between coded slices of video data in this PES_packet, so the decoder does not have to save co-sited macroblocks of previously decoded pictures. This error reports that there were missing macroblocks and this could lead to display oddities.

>>> [MPEG-2] ERROR 2455 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet has forbidden rep_cntrl value 0

>>> [MPEG-2] ERROR 2456 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet : previous_PES_packet_CRC check failed
The CRC is calculated over the data bytes of the previous PES_packet, the PES_packet header is excluded from the CRC calculation, because it can be modified during transport.

>>> [MPEG-2] ERROR 2457 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet has pack_header_field_flag set in a Program Stream
The pack_header_field_flag shall only be set to ‘1’ in a Transport Stream, to indicate that the Pack header is encoded in the stream.

>>> [MPEG-2] ERROR 2458 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet private_data emulates a start_code_prefix 0x000001
The private_data shall be coded in such a way that this data, combined with the fields before and after, do not emulate the packet start code prefix 0x000001.

>>> [MPEG-2] ERROR 2459 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet has MPEG-1_MPEG-2_identifier=0 in an MPEG-2 Program Stream
If this flag is used in an MPEG-2 PS, it can only indicate that this (MPEG-2) packet carries data of an originally MPEG-1 PS.

>>> [MPEG-2] ERROR 2460 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet original_stuff_length ‘value’ larger than the allowed ‘number’.

>>> [MPEG-2] ERROR 2461 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet pack_field_length ‘value’ should be minimal 14
The minimum length of a valid pack_header is 14 bytes.

>>> [MPEG-2] ERROR 2462 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet program_packet_sequence_counter has illegal increment (‘value’ -> ‘value’)
The program_packet_sequence_counter is an optional counter that increments with each successive PES_packet from a Program stream or from an ISO/IEC 11172-1 Stream or the PES_packets associated with a single program definition in a Transport stream. This error reports any gaps in the program_packet_sequence_counter values.



>>> [MPEG-2] ERROR 2463 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet program_packet_sequence_counter value ‘value’ is repeated

The program_packet_sequence_counter value is a 7 bit field, that counts successive PES_packets in a stream. The counter will wrap around to the value ‘0’ after its maximum value. Repetition of PES_packets shall not occur, therefore, no two consecutive PES_packets in the program multiplex shall have identical program_packet_sequence_counter values.

>>> [MPEG-2] SYNTAX ERROR 2464 (ref. MPEG-2 Systems 2.4.3.6) :

PES_packet 2-bit P-STD marker is not ‘01’

>>> [MPEG-2] SYNTAX ERROR 2465 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet PES_extension_field_length ‘value’ too large

PES_header_data_length allows for only ‘number’

The PES_extension_field_length increased with the already parsed bytes from the PES_header is larger than the PES_header_data_length field from the PES_packet header. This could be caused by:

- An invalid PES_extension_field_length field
- An incorrect PES_packet header flag, causing the parser to parse incorrect data.

>>> [MPEG-2] SYNTAX ERROR 2466 (ref. MPEG-2 Systems 2.4.3.7) :

PES_packet extension_field reserved byte[‘index number’] is ‘hexadecimal value’, should be 0xFF
All reserved bytes should be coded as ‘0xFF’.

4.3.2.3 MPEG-2 Sequence header checks

>>> [MPEG-2] ERROR 2500 (ref. MPEG-2 Video various) :

Marker_bit is 0

All market_bits should be coded as ‘1’.

>>> [MPEG-2] ERROR 2501 (ref. MPEG-2 Video 6.3.1) :

Sequence_header is not followed by a sequence_extension

In an MPEG-2 sequence the first Sequence_header should be followed by a Sequence_extension header.

>>> [MPEG-2] ERROR 2502 (ref. MPEG-2 Video 6.3.1) :

More than one sequence_extension specified after current sequence_header

In MPEG-2 streams, the Sequence_header should always be followed by only one Sequence_extension header.

>>> [MPEG-2] ERROR 2503 (ref. MPEG-2 Video Table 8-5) :

Sequence_scalable_extension not consistent with profile ‘profile type string’

The Sequence_scalable_extension header should not be encoded for the ‘Simple’ and ‘Main’ profiles, only for the ‘SNR’, ‘Spatial’ and ‘High’ profiles.

>>> [MPEG-2] ERROR 2505 (ref. MPEG-2 Video 6.1.1.6) :

Unexpected sequence_display_extension

If the first Sequence_header in the sequence is not followed by an Sequence_display_extension header, all subsequent Sequence_headers should also not be followed by a Sequence_display_extension header, thus the Sequence_display_extension should not be encoded in the Sequence.

>>> [MPEG-2] ERROR 2506 (ref. MPEG-2 Video 6.3.1) :

More than one sequence_display_extension specified after current sequence_header

>>> [MPEG-2] ERROR 2508 (ref. MPEG-2 Video 6.1.1.6) :

Unexpected sequence_scalable_extension

If the first Sequence_header in the sequence is not followed by an Sequence_scalable_extension header, all subsequent Sequence_headers should also not be followed by a Sequence_scalable_extension header, thus the Sequence_scalable_extension should not be encoded in the Sequence.

>>> [MPEG-2] ERROR 2509 (ref. MPEG-2 Video 6.3.1) :

More than one sequence_scalable_extension specified after current sequence_header

>>> [MPEG-2] ERROR 2510 (ref. MPEG-2 Video 6.2.2.2.1) :

Sequence_header followed by an illegal extension

The Sequence_header is only allowed to be followed by these extensions:

- Sequence_display_extension
- Sequence_scalable_extension

>>> [MPEG-2] ERROR 2522 (ref. MPEG-2 Video Table 8-11) :

Sequence_header horizontal_size is ‘value’, should be <= ‘maximum value’ for profile/level ‘profile type string’/‘level type string’

The maximum horizontal size for the encoded profiles and levels must comply with the following table::

Profile	Level	Maximum horizontal size
Simple	Main / Main 422	720
Main	Main / Main 422	720
SNR scale	Main / Main 422	720
422	Main / Main 422	720
<Any>	Low	352

>>> [MPEG-2] ERROR 2527 (ref. MPEG-2 Video Table 8-11) :

Sequence_header vertical_size is ‘value’, should be <= ‘maximum value’ for profile/level level ‘profile type string’/‘level type string’

The maximum vertical size for the encoded profiles and levels must comply with the following table:

Profile	Level	Maximum vertical size
Simple	Main	576
Main	Main	576
SNR scale	Main	576
422	Main 422	608
<Any>	Low	288

>>> [MPEG-2] ERROR 2530 (ref. MPEG-2 Video 6.3.3) :

sequence_extension : frame_rate_code table entry exists :

frame_rate_extension values (‘counter’,‘denominator’) should be 0

>>> [MPEG-2] ERROR 2531 (ref. MPEG-2 Video 6.3.3) :

sequence_extension frame_rate_extension values (%d,’denominator’) have common divisor > 1

>>> [MPEG-2] ERROR 2534 (ref. MPEG-2 Video Table 8-7) :

Sequence_header : frame_rate ‘value’ must be ‘value’ when vertical_size > ‘value’ for profile/level ‘profile type string’/‘level type string’

The frame_rate for the encoded profiles and levels must comply with the following table:

Profile	Level	Vertical size	Maximum frame rate code
Simple	Main	480	3 (25 Hz)
Main	Main	480	3 (25 Hz)



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422	Main 422	512	3 (25 Hz)
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>>> [MPEG-2] ERROR 2535 (ref. MPEG-2 Video Table 8-11) :

Sequence_header : frame_rate is ‘value’, must be <= ‘maximum value’ for profile/level ‘profile type string’/‘level type string’

The maximum frame_rate for the encoded profiles and levels must comply with the following table:

Profile	Level	Maximum frame rate code
<Any>	Main / Main 422 / Low	5 (30 Hz)

>>> [MPEG-2] ERROR 2536 (ref. MPEG-2 Video Table 8-12) :

Sequence_header : sample_rate is ‘value’, must be <= ‘maximum value’ for profile/level ‘profile type string’/‘level type string’

The maximum sample_rate for the encoded profiles and levels must comply with the following table:

Profile	Level	Maximum sample rate (bit/sec)
Simple	Main	10368000
Main	Main	10368000
SNR scale	Main	10368000
Main 422	Main 422	11059200
<Any>	Low	3041280

>>> [MPEG-2] ERROR 2538 (ref. MPEG-2 Video 6.3.3) :

sequence_extension bitrate is ‘value’ Mbit/s, must be <= ‘maximum value’ Mbit/s for profile/level ‘profile type string’/‘level type string’

The maximum sequence_extension bitrate for the encoded profiles and levels must comply with the following table:

Profile	Level	Maximum vertical size (bit/sec)
Simple	Main	15.000.000
Main	Main	15.000.000
Main 422	Main 422	50.000.000

>>> [MPEG-2] ERROR 2539 (ref. MPEG-2 Video Table 8-14) :

sequence_extension vbv_buffer_size is ‘value’ KBytes, must be <= ‘maximum value’ KBytes for profile/level ‘profile type string’/‘level type string’

The maximum vbv_buffer_size for the encoded profiles and levels must comply with the following table:

Profile	Level	Maximum vbv buffer size (KB)
Simple	Main	224 KB = 1835008 bit
Main	Main	224 KB = 1835008 bit
Main 422	Main 422	1152 KB = 9437184 bit

>>> [MPEG-2] ERROR 2540 (ref. MPEG-2 Video 6.3.3) :

Sequence_header constrained_parameters_flag must be 0

This flag, which no longer has any meaning in MPEG-2, should never be set .

>>> [MPEG-2] WARNING 2541 (ref. MPEG-2 Video 8.1) :

This MPEG-2 (PS or TS) system stream contains a non-constrained parameters MPEG-1 video stream, which might not be decodable by some MPEG-2 decoders !

>>> [MPEG-2] ERROR 2550 (ref. MPEG-2 Video Table 8-5) :

Sequence_extension chroma_format ‘value’ inconsistent with specified profile
The 422 and 444 chroma_format types are only allowed in a Program Stream with a ‘Main 422’ or ‘High’ profile.

>>> [MPEG-2] ERROR 2555 (ref. MPEG-2 Video 6.3.6) :

Sequence_display_extension video_format ‘value’ reserved
The sequence_display_extension specified a reserved video_format value, i.e. a value larger than 0x6.

>>> [MPEG-2] ERROR 2556 (ref. MPEG-2 Video 6.3.6) :

Sequence_display_extension colour_primaries ‘value’ reserved
The sequence_display_extension specified a reserved colour_primaries value, i.e. a value larger than 0x8.

>>> [MPEG-2] ERROR 2557 (ref. MPEG-2 Video 6.3.6) :

Sequence_display_extension transfer_charact. ‘value’ reserved
The sequence_display_extension specified a reserved transfer_characteristics value, i.e. a value larger than 0x9.

>>> [MPEG-2] ERROR 2580 (ref. MPEG Video 8 (before 8.1)) :

Sequence_extension profile_and_level_indication is ‘hexadecimal value’
Illegal profile and/or level is specified.

>>> [MPEG-2] ERROR 2581 (ref. MPEG Video 6.3.5) :

Sequence_extension profile_and_level_indication is ‘value’, previously defined to be ‘previous value’
All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] ERROR 2582 (ref. MPEG Video 6.3.5) :

Sequence_extension progressive_sequence is ‘value’, previously defined to be ‘previous value’
All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] ERROR 2583 (ref. MPEG Video 6.3.5) :

Sequence_extension chroma_format is ‘value’
The sequence_display_extension specified a reserved chroma_format value, i.e. the value 0x0.

>>> [MPEG-2] ERROR 2584 (ref. MPEG Video 6.3.5) :

Sequence_extension chroma_format is ‘value’, previously defined to be ‘previous value’
All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] ERROR 2585 (ref. MPEG Video 6.3.3 & 6.3.5) :

Sequence_extension horizontal_size is ‘value’, previously defined to be ‘previous value’
All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] SYNTAX ERROR 2586 (ref. MPEG Video 6.3.5) :

Sequence_extension marker bit is 0

>>> [MPEG-2] ERROR 2587 (ref. MPEG Video 6.3.3 & 6.3.5) :

Sequence_extension vertical_size is ‘value’, previously defined to be ‘previous value’
All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.



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>>> [MPEG-2] ERROR 2588 (ref. MPEG Video 6.3.3 & 6.3.5) :

Sequence_extension bit_rate is 0

>>> [MPEG-2] ERROR 2589 (ref. MPEG Video 6.3.3 & 6.3.5) :

Sequence_extension bit_rate is ‘value’, previously defined to be ‘previous value’

All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] ERROR 2590 (ref. MPEG Video 6.3.3 & 6.3.5) :

Sequence_extension buffer size is ‘value’ KBytes, previously defined to be ‘previous value’ KBytes

All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] ERROR 2591 (ref. MPEG Video 6.3.5) :

Sequence_extension low_delay is ‘value’, previously defined to be ‘previous value’

All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] ERROR 2592 (ref. MPEG Video 6.3.5) :

Sequence_extension frame_rate_extension_n is ‘value’, previously defined to be ‘previous value’

All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] ERROR 2593 (ref. MPEG Video 6.3.5) :

Sequence_extension frame_rate_extension_d is ‘value’, previously defined to be ‘previous value’

All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] ERROR 2600 (ref. MPEG Video 6.3.6) :

Sequence_display_extension video_format is ‘value’, previously defined to be ‘value’

All of the fields in repeated Sequence_display_extension headers shall have the same values as the first Sequence_display_extension header in the stream.

>>> [MPEG-2] ERROR 2601 (ref. MPEG Video 6.3.6) :

Sequence_display_extension colour_description is ‘value’, previously defined to be ‘previous value’

All of the fields in repeated Sequence_display_extension headers shall have the same values as the first Sequence_display_extension header in the stream.

>>> [MPEG-2] ERROR 2602 (ref. MPEG Video 6.3.6) :

Sequence_display_extension colour_primaries is ‘value’, previously defined to be ‘previous value’

All of the fields in repeated sequence_extension headers shall have the same values as the first sequence_extension header in the stream.

>>> [MPEG-2] ERROR 2603 (ref. MPEG Video 6.3.6) :

Sequence_display_extension transfer_characteristics is ‘value’, previously defined to be ‘previous value’

All of the fields in repeated Sequence_display_extension headers shall have the same values as the first Sequence_display_extension header in the stream.

>>> [MPEG-2] ERROR 2604 (ref. MPEG Video 6.3.6) :

Sequence_display_extension matrix_coefficients is ‘value’

The sequence_display_extension specified a reserved matrix_coefficients value, i.e. the value 0x0 or a value larger than 0x8.

>>> [MPEG-2] ERROR 2605 (ref. MPEG Video 6.3.6) :

Sequence_display_extension matrix_coefficients is ‘value’, previously defined to be ‘previous value’
All of the fields in repeated Sequence_display_extension headers shall have the same values as the first Sequence_display_extension header in the stream.

>>> [MPEG-2] ERROR 2606 (ref. MPEG Video 6.3.6) :

Sequence_display_extension display_horizontal_size is ‘value’, previously defined to be ‘previous value’
All of the fields in repeated Sequence_display_extension headers shall have the same values as the first Sequence_display_extension header in the stream.

>>> [MPEG-2] ERROR 2607 (ref. MPEG Video 6.3.6) :

Sequence_display_extension display_vertical_size is ‘value’, previously defined to be ‘previous value’
All of the fields in repeated Sequence_display_extension headers shall have the same values as the first Sequence_display_extension header in the stream.

4.3.2.4 MPEG-2 GOP checks

>>> [MPEG-2] ERROR 2621 (ref. MPEG-2 Video 6.3.1) :

GOP header is followed by extension_data

4.3.2.5 MPEG-2 Picture checks

>>> [MPEG-2] ERROR 2650 (ref. MPEG-2 Video 6.3.1) :

Picture is not followed by a picture_coding_extension

A picture in an MPEG-2 compliant stream must always be followed by a picture_extension header. The parser will recover until the next start code.

>>> [MPEG-2] ERROR 2651 (ref. MPEG-2 Video 6.3.1) :

More than one picture_coding_extension specified after current picture_header

>>> [MPEG-2] ERROR 2652 (ref. MPEG-2 Video 6.3.1) :

More than one quant_matrix_extension specified after current picture_header

>>> [MPEG-2] ERROR 2653 (ref. MPEG-2 Video 6.3.12) :

Picture_display_extension only allowed when a sequence_display_extension present

>>> [MPEG-2] ERROR 2654 (ref. MPEG-2 Video 6.3.1) :

More than one Picture_display_extension specified after current picture_header

>>> [MPEG-2] ERROR 2655 (ref. MPEG-2 Video Table 8-5) :

Picture_scalable_extension not consistent with profile ‘profile type string’

A Picture_scalable_extension is not allowed to be encoded in Program Streams with the following profiles:

- Simple profile
- Main profile
- SNR scalable profile

>>> [MPEG-2] ERROR 2656 (ref. MPEG-2 Video 6.3.1) :

More than one picture_spatial_scalable_extension specified after current picture_header

>>> [MPEG-2] ERROR 2657 (ref. MPEG-2 Video 6.3.1) :

More than one picture_temporal_scalable_extension specified after current picture_header



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>>> [MPEG-2] ERROR 2658 (ref. MPEG-2 Video 6.3.1) :

More than one copyright_extension specified after current picture_header

>>> [MPEG-2] ERROR 2659 (ref. MPEG-2 Video 6.2.2.2.1) :

Picture_header followed by an illegal extension

A Picture header is allowed to be followed by one of these extensions:

- Copyright_extension
- Picture temporal scalable extension
- Picture spatial scalable extension
- Picture display extension
- Quantiser matrix extension
- Picture coding extension

The parser did not find any of these extensions after the Picture header and will recover to the next valid start code.

>>> [MPEG-2] ERROR 2673 (ref. MPEG-2 Video Table 8-5) :

B-pictures are not permitted with Simple Profile

>>> [MPEG-2] ERROR 2675 (ref. MPEG-2 Video 6.1.1.11) :

First picture after a sequence header must be either an I- or a P-picture

>>> [MPEG-2] ERROR 2676 (ref. MPEG-2 Video 6.3.9) :

Picture_header picture_coding_type of both frame pictures should be the same

In case of pictures that are encoded using 2 interlaced frame pictures, the picture_coding_type in the Picture_header must describe the same value for each frame of the picture.

>>> [MPEG-2] ERROR 2677 (ref. MPEG-2 Video 6.3.10) :

Picture_header picture_coding_type of the 2nd frame picture should be I or P

When a frame is encoded as two field pictures, both fields must be of the same picture_coding_type, except when the 1st encoded field is an I-picture (then the 2nd may be either an I- or P-picture).

>>> [MPEG-2] ERROR 2678 (ref. MPEG-2 Video 6.3.5) :

Picture_header : low_delay sequence does not allow B-pictures

>>> [MPEG-2] ERROR 2681 (ref. MPEG-2 Video 6.3.9) :

Picture_header full_pel_forward|backward_vector should be 0

The full_pel_backward_vector must be '0' for a B-picture, the full_pel_forward_vector must be '0' for both B-pictures and P-pictures.

>>> [MPEG-2] ERROR 2682 (ref. MPEG-2 Video 6.3.9) :

Picture_header 'forward|backward'_f_code should be 0x7

The backward_f_code must be '0x7' for a B-picture, the forward_f_code must be '0x7' for both B-pictures and P-pictures.

>>> [MPEG-2] ERROR 2690 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension 'forward|backward'_horizontal|vertical'_f_code has the forbidden value 0

>>> [MPEG-2] ERROR 2691 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension 'forward|backward'_horizontal|vertical'_f_code has the reserved value 'value'

One of these fields specified a reserved _f_code, i.e. a value in the range [10..14]:

- forward_horizontal_f_code
- forward_vertical_f_code
- backward_horizontal_f_code
- backward_vertical_f_code

>>> [MPEG-2] ERROR 2692 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension ‘forward|backward’_‘horizontal|vertical’_f_code should be 0xF

The value ‘0xF’ should be encoded for the specified _f_code in these cases:

- The picture type is ‘I’ and the concealment_motion_vectors field from the Picture_coding_extension equals ‘0’.
- The picture type is either ‘I’ or ‘P’ and the specified _f_code is a forward_.._f_code.

>>> [MPEG-2] ERROR 2694 (ref. MPEG-2 Video Table 8-8) :

Picture_coding_extension ‘forward|backward’_‘horizontal|vertical’_f_code is ‘value’, must be <= ‘maximum value’ for ‘level type string’ level

This error is reported when:

- The stream uses the Low level encoding scheme and the .._horizontal_f_code exceeds ‘7’.
- The stream uses the Main level encoding scheme and the .._horizontal_f_code exceeds ‘8’.
- The stream uses the Low level encoding scheme with frame pictures _f_code exceeds ‘4’.
- The stream uses the Main level encoding scheme with frame pictures _f_code exceeds ‘5’.
- The stream uses the Low level encoding scheme without frame pictures _f_code exceeds ‘3’.
- The stream uses the Main level encoding scheme without frame pictures _f_code exceeds ‘4’.

>>> [MPEG-2] ERROR 2696 (ref. MPEG-2 Video Table 8-5) :

Picture_coding_extension intra_dc_precision ‘value’ inconsistent with profile ‘profile type string’
This error is reported when the intra_dc_precision value is not encoded as ‘11b’ with these profiles:

- Simple profile
- Main profile
- SNR scalable profile
- Spatial scalable profile

>>> [MPEG-2] ERROR 2700 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension picture_structure value ‘0’ reserved

>>> [MPEG-2] ERROR 2701 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension picture_structure of a frames’s 2nd field (‘value’) must be of opposite parity
If the picture_structure from the Picture_coding_extension describes the field type of the picture, this field type must alternate between the TOP field and BOTTOM field values.

>>> [MPEG-2] ERROR 2705 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension top_field_first for a field_picture should be 0

>>> [MPEG-2] ERROR 2706 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension top_field_first for repeat_first_field=1 should be 0.

>>> [MPEG-2] ERROR 2707 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension frame_pred_frame_dct for a field_picture should be 0

>>> [MPEG-2] ERROR 2708 (ref. MPEG-2 Video Corrigendum: item 5) :

Picture_coding_extension frame_pred_frame_dct should be 1 when progressive_sequence is 1

>>> [MPEG-2] ERROR 2709 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension repeat_first_field for a field_picture should be 0

>>> [MPEG-2] ERROR 2710 (ref. MPEG-2 Video 6.3.10) :

Picture_coding_extension repeat_first_field for non-progressive_frame should be 0



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>>> [MPEG-2] ERROR 2711 (ref. MPEG-2 Video Table 8-7) :
 Picture_coding_extension repeat_first_field for PAL B-picture should be 0

>>> [MPEG-2] ERROR 2712 (ref. MPEG-2 Video Table 8-7) :
 Picture_coding_extension repeat_first_field does not satisfy the constraints

>>> [MPEG-2] ERROR 2713 (ref. MPEG-2 Video 6.3.10) :
 Picture_coding_extension chroma_420_type should be 0

>>> [MPEG-2] ERROR 2714 (ref. MPEG-2 Video 6.3.10) :
 Picture_coding_extension chroma_420_type must be the same as progressive_frame

>>> [MPEG-2] ERROR 2720 (ref. MPEG Video 6.3.11) :
 Quant_matrix_extension 'type'intra_quantiser_matrix['index'] is 0

>>> [MPEG-2] ERROR 2721 (ref. MPEG Video 6.3.11) :
 Quant_matrix_extension 'type'intra_quantiser_matrix[0] is 'value', should be 8

>>> [MPEG-2] ERROR 2723 (ref. MPEG Video 6.3.11) :
 Quant_matrix_extension load_chroma_'type'intra_quantiser_matrix is 1, should be 0 when chroma-format is 4:2:0

>>> [MPEG-2] ERROR 2724 (ref. MPEG Video 6.3.15) :
 Copyright_extension copyright_identifier should be 0 when copyright_flag is 0

>>> [MPEG-2] ERROR 2725 (ref. MPEG Video 6.3.15) :
 Copyright_extension reserved should be 0

>>> [MPEG-2] WARNING 2726 (ref. MPEG Video 2-C.1 | Ann.C) :
 VBV buffer underflow for picture 'number' ('number' bytes, m='value')

>>> [MPEG-2] ERROR 2727 (ref. MPEG Video 2-C.1 | Ann.C) :
 Splicing point VBV buffer overflow for picture 'number' ('number' bytes, m='value')

4.3.2.6 **MPEG-2 Slice checks**

>>> [MPEG-2] ERROR 2751 (ref. MPEG Video 6.3.16) :
 Slice vertical position 'value', vertical position of previous slice is 'value', the difference between the vertical position of current slice and the previous one should be 0 or 1
 This error is reported when the slice_vertical_position is smaller or more than 1 larger than the previous slice_vertical_position. Since Slices shall occur in the bit stream in the order in which they are encountered, the slice_vertical_position cannot be smaller than the previous slice_vertical_position and since the first and last macroblock of a slice shall be in the same horizontal row of macroblocks, the Slice is always equal to or less than 1 complete line.

>>> [MPEG-2] ERROR 2752 (ref. MPEG-2 Video 6.3.16) :
 Slice vertical_position ('value') should be < 128
 The slice_vertical_position shall be in the range [1:128] when the slice_vertical_position_extension is present in the Program Stream.

>>> [MPEG-2] WARNING 2759 (ref. MPEG-2 Video 6.3.16) :
 Slice intra_slice set, but non-intra macroblocks occur
 The intra_slice flag shall be set to '0' if any of the macroblocks in the slice are non-intra macroblocks. This flag may only be set to '1' when all of the macroblocks in the Slice are intra macroblocks.

>>> [MPEG-2] ERROR 2761 (ref. MPEG-2 Video Corrigendum: item 9) :
 Slice slice_picture_id should be 0 when slice_picture_id_enable is 0

>>> [MPEG-2] ERROR 2762 (ref. MPEG-2 Video Corrigendum: item 9) :
 Slice slice_picture_id_enable is 'value', previously defined to be 'previous value'
 The slice_picture_id_enable shall have the same value as encoded for the slice_picture_id_enable from the first slice of a picture.

>>> [MPEG-2] ERROR 2763 (ref. MPEG-2 Video Corrigendum: item 9) :
 Slice slice_picture_id is 'value', previously defined to be 'previous value'
 The slice_picture_id shall have the same value as encoded for the slice_picture_id from the first slice of a picture.

4.3.2.7 **MPEG-2 Macroblock checks**

>>> [MPEG-2] ERROR 2771 (ref. MPEG-2 Video 6.3.17) :
 Macroblock stuffing illegal
 Macroblock stuffing is not allowed in MPEG-2 video streams.

>>> [MPEG-2] ERROR 2772 (ref. MPEG-2 Video 6.3.17.1) :
 Macroblock frame_motion_type value 'value' reserved
 The frame_motion_type in the Macroblock specified a reserved value, i.e. '0x0'

>>> [MPEG-2] ERROR 2773 (ref. MPEG-2 Video 6.3.17.1) :
 Macroblock field_motion_type value 'value' reserved
 The field_motion_type in the Macroblock specified a reserved value, i.e. '0x0'

>>> [MPEG-2] ERROR 2774 (ref. MPEG-2 Video Table B-9) :
 Coded_block_pattern is 0 when chroma_format is 4:2:0
 The coded_block_pattern value '0' shall not be used with 4:2:0 chrominance structure.

>>> [MPEG-2] ERROR 2775 (ref. MPEG-2 Video 7.6.3.5) :
 Macroblock non-frame prediction within a P frame picture in case macroblock_motion_forward is zero and macroblock_intra is zero as well
 The prediction_type in the macroblocks belonging to a P frame picture with macroblock_motion_forward and macroblock_intra equalling '0', should be "frame-based", i.e. '10b'.

>>> [MPEG-2] ERROR 2776 (ref. MPEG-2 Video 7.6.1) :
 Macroblock non-field prediction within a P field picture in case macroblock_motion_forward is zero and macroblock_intra is zero as well
 The prediction_type in the macroblocks belonging to a P field picture with macroblock_motion_forward and macroblock_intra equalling '0', should be "field-based", i.e. '01b'.

>>> [MPEG-2] ERROR 2778 (ref. MPEG-2 Video 7.6.1) :
 Macroblock dual-prime prediction with a B-picture between predicted & reference pictures
 The Dual-prime prediction mode may only be used in P-pictures (field or frame encoded) when there are no B-pictures between the predicted and reference fields or frames.



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>>> [MPEG-2] ERROR 2780 (ref. MPEG-2 Video 7.6.3.5) :

Macroblock dual-prime prediction illegal in a 2nd P-field of an I-frame

In the case that a P field picture is used as the second field of a frame, in which the first field is an I field picture, the Dual-prime prediction mode shall not be used. This ensures that prediction is only made from the I field picture.

>>> [MPEG-2] ERROR 2785 (ref. MPEG-2 Video 7.6.3.5) :

Macroblock macroblock_motion_forward=0 & macroblock_intra=0 combination is illegal in a 2nd P-field of an I-frame

In the case that a P field picture is used as the second field of a frame, in which the first field is an I field picture, the macroblock_motion_forward and macroblock_intra shall be encoded as '0'.

>>> [MPEG-2] ERROR 2786 (ref. MPEG-2 Video 7.6.3.5) :

Skipped macroblocks not allowed in a 2nd P-field of an I-frame

In the case that a P field picture is used as the second field of a frame, in which the first field is an I field picture, there shall be no skipped macroblocks.

>>> [MPEG-2] ERROR 2787 (ref. MPEG-2 Video 7.6.3.5) :

Macroblock motion_vertical_field_select has the same parity as the field being predicted, in a 2nd P-field of an I-frame

In the case that a P field picture is used as the second field of a frame, in which the first field is an I field picture, the motion_vertical_field_select shall not indicate the same parity as the field being predicted. This ensures that prediction is only made from the I field picture.

>>> [MPEG-2] ODDITY 2796 (ref. MPEG-2 Video 7.6.3.9) :

Vertical component of concealment vector of in last row of picture greater than 0

For all macroblocks, concealment motion vectors should be appropriate for use in the macroblock that lies vertically below the macroblock in which the motion vector occurs. Since the bottom row of macroblocks have no macroblocks that lie vertically below them, the vertical component of concealment vector should be encoded as '0'. This message is reported as an ODDITY.

>>> [MPEG-2] ERROR 2797 (ref. MPEG-2 Video 8.2) :

More than 2 macroblocks exceed the max. number of bits 'number'

Only 2 macroblocks in each horizontal row of macroblocks may exceed the following size:

chroma format	maximum number of bits
4:2:0	4608
4:2:2	6144
4:4:4	9216

4.3.2.8 MPEG-2 Audio checks

>>> [MPEG-2] ERROR 2851 :

Base frame data ‘number’ bytes ahead of extension frame data (allowed 4096 bytes)

The base and extension streams for Audio must be multiplexed in such a way that the base frame and the associated extension frame are no more than 4096 bytes apart.

>>> [MPEG-2] ERROR 2852 :

Extension frame data ‘number’ bytes ahead of base frame data (allowed 4096 bytes)

The base and extension streams for Audio must be multiplexed in such a way that the base frame and the associated extension frame are no more than 4096 bytes apart.

>>> [MPEG-2] SYNTAX ERROR 2855 (ref. MPEG-2 Audio) :

Specified number of ancillary data bytes (‘value’) does not fit in frame

The specified n_ad_bytes, together with the already parsed bytes from the Audio base frame, should be maximum 1152 bytes long. This error could indicate a n error in the n_ad_bytes field or with the encoding of the other fields in the base frame.

>>> [MPEG-2] ERROR 2856 (ref. MPEG-2 Audio 2.5.3.1) :

Not all fields of mc_header fit in base frame

In case of an MPEG-2 multichannel Audio stream, the base frame should consist of the complete MPEG-1 audio data and the complete MPEG-2 multichannel header. This error reports that some fields of the multichannel header could not be parsed before the end of the base frame. This is usually caused by decoding an MPEG-1 Audio stream with the standard MPEG-2 setting of the parser.

>>> [MPEG-2] ERROR 2857 (ref. MPEG-2 Audio 2.5.2.13) :

Centre value '10b' is not defined.

The value '10b' or the centre field is not defined and therefore not to be used.

>>> [MPEG-2] ERROR 2858 (ref. MPEG-2 Audio 0.2.3.2) :

In ‘mode type string’ mode, no centre channel allowed

These modes cannot specify a centre channel:

- Single channel
- Dual channel

>>> [MPEG-2] ERROR 2859 (ref. MPEG-2 Audio 0.2.3.2) :

In ‘mode type string’ mode, no ‘surround type string’ allowed

These modes cannot specify a mono or stereo surround channel:

- Single channel
- Dual channel

>>> [MPEG-2] ERROR 2860 (ref. MPEG-2 Audio 0.2.3.2) :

In ‘mode type string’ mode, no lfe allowed

An Audio stream in 1/0 configuration (single channel, without a second 2/0 stereo programme) cannot specify a low frequency enhancement channel.

>>> [MPEG-2] ERROR 2861 (ref. MPEG-2 Audio 2.5.2.13) :

Dematrix_procedure value '10' is only allowed in 3/1 or 3/2 configuration



>>> [MPEG-2] ERROR 2862 (ref. MPEG-2 Audio 2.5.2.15) :

Tc_allocation value ‘value’ exceeds maximum allowed value ‘maximum value’ for current configuration
The Tc_allocation is restricted according to:

	Centre channel	yes	no
Surround mode			
None	2	-	
Mono	5	2	
Stereo	7	3	
Second programme	2	-	

>>> [MPEG-2] ERROR 2864 (ref. MPEG-2 Audio 2.5.2.15) :

Tc_allocation value ‘value’ is not allowed if Phantom coding is used (centre == ‘11’)
In case of Phantom coding of the centre (centre = ‘11b’) channel, the Tc_allocation is should not specify the values ‘5’ (when the surround mode equals Stereo Surround (surround = ‘10b’)) and ‘1’ and ‘2’.

>>> [MPEG-2] ERROR 2865 (ref. MPEG-2 Audio 2.5.2.15) :

Dyn_cross_mode has forbidden value ‘value’ for current configuration

The Dyn_cross_mode is restricted according to:

	Centre channel	yes	no
Surround mode			
None	1	-	
Mono	4	1	
Stereo	14	4	
Second programme	1	-	

>>> [MPEG-2] ERROR 2866 (ref. MPEG-2 Audio 2.5.2.10) :

Ext_header has reserved ext_ID_bit value ‘value’
The ext_ID_bit should be set to ‘0’, as it is reserved for future use.

4.4 DVD checks

4.4.1 DVD System checks

>>> [DVD] ERROR 3001 (ref. DVD-3 2.1) :

ERR_DVD_SRSV_0

Reserved bits shall be all 0.

>>> [DVD] ERROR 3002 (ref. N/A) :

ERR_DVD_ILLEGAL_ILVU

An illegal ILVU has been found. Since only Angle blocks are supported, this ILVU would be the ‘number’-th Angle, while only ‘number’ Angles defined in the current Title. Possible causes:

- The Title specified the wrong number of Angles
- An unsupported Parental block in the stream
- An unsupported Language credit block in the stream

Parsing is stopped!!!!

>>> [DVD] ERROR 3005 (ref. N/A) :

ERR_DVD_NO_XCHECK_PARAS

Necessary cross check parameters not found on the cross check data file! Default values are used for missing cross check parameters.

>>> [DVD] SYNTAX ERROR 3009 :

ERR_DVD_SYNTAX_RECOVER

Parsing impossible due to syntax error : data skipped

4.4.2 DVD VOB checks

>>> [DVD] INFORMATION 3011 :

ERR_DVD_NEW_VOB

New VOB start!

>>> [DVD] INFORMATION 3012 :

ERR_DVD_NEW_CELL

New Cell start !

>>> [DVD] INFORMATION 3013 :

ERR_DVD_NEW_ILVB

New Interleaved Block start !

>>> [DVD] INFORMATION 3014 :

ERR_DVD_NEW_ILVU

New Interleaved Unit start !

>>> [DVD] ERROR 3015 (ref. DVD-3 Table 5.1-1) :

ERR_DVD_1ST_VOBU_VID

The first VOBU of a VOB should have the video data



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>>> [DVD] ODDITY 3020 :
ERR_DVD_VOBU_EMPTY
The previous VOBU does not contain any data !

>>> [DVD] ERROR 3022 (ref. DVD-3 5.1.1) :
ERR_DVD_VOBU_MIN_LEN
A VOBU represents a presentation period of at least 0.4 seconds.

>>> [DVD] ERROR 3023 (ref. DVD-3 5.1.1) :
ERR_DVD_VOBU_MAX_LEN
A VOBU except the last VOBU of a cell shall represent a presentation period of at most 1 second. The last VOBU of a cell shall represent a presentation period of at most 1.2 seconds.

>>> [DVD] ERROR 3025 (ref. DVD-3 5.1.1 rule 1) :
ERR_DVD_VOBU_PERIOD
The presentation period of a VOBU is equal to an integer number of video field periods. This is also the case when the VOBU does not contain any video data.

>>> [DVD] ERROR 3027 (ref. DVD-3 5.1.1 rule 2) :
ERR_DVD_VOBU_START
The presentation start and termination time of a VOBU are defined in 90 kHz units. The presentation start time of a VOBU is equal to the presentation termination time of the previous VOBU. (except for the first VOBU).

>>> [DVD] WARNING 3031 (ref. DVD-3 5.1.1) :
ERR_DVD_VOBU PTS_VOBU_START
The current VOBU contains a PTS, which is more than a video field period earlier than the VOBU presentation start time.

>>> [DVD] WARNING 3032 (ref. DVD-3 5.1.1) :
ERR_DVD_VOBU PTS_VIDEO_START
The current VOBU contains a PTS, which is more than a video field period earlier than its video presentation start time.

>>> [DVD] WARNING 3033 (ref. DVD-3 5.1.1) :
ERR_DVD_VOBU PTS_VOBU_END
The current VOBU contains a PU with a presentation time, which is more than a video field period later than the VOBU presentation termination time.

>>> [DVD] ERROR 3041 (ref. DVD-3 5.1.1 rule 5) :
ERR_DVD_VOBU_NOVID_NO_SEQ_END
When a VOBU with video data is followed by a VOBU without video data (in the same VOB), the last coded picture must be followed by a sequence_end_code.

>>> [DVD] ERROR 3042 (ref. DVD-3 5.1.1 rule 6) :
ERR_DVD_VOBU_LONG_NO_SEQ_END
When the presentation period of the VOBU is longer than the presentation period of the video it contains, the last coded picture must be followed by a sequence_end_code.

>>> [DVD] ERROR 3043 (ref. DVD-3 5.1.1 rule 7) :
ERR_DVD_VOBU_MULTI_SEQ_END
The video data in a VOBU must never contain more than one sequence_end_code.

>>> [DVD] ERROR 3046 (ref. DVD-3 5.4.1) :
ERR_DVD_VOBU_NO_SEQ_HDR
A VOBU's video data must start with a sequence_header.

>>> [DVD] ERROR 3047 (ref. DVD-3 5.4.1) :
ERR_DVD_VOBU_NO_GOP_HDR
A VOBU's video data must have a GOP_header following the sequence_header at the start.

>>> [DVD] ERROR 3048 (ref. DVD-3 5.4.1) :
ERR_DVD_VOBU_NO_I_PIC
A VOBU's video data must have an I-picture following the sequence_ & GOP_header at the start.

4.4.3 DVD Pack checks

>>> [DVD] ERROR 3101 (ref. DVD-3 5.2.1) :
ERR_DVD_PACK_LEN
The Pack length must be 2048 bytes.

>>> [DVD] ERROR 3103 (ref. DVD-3 5.2.1) :
ERR_DVD_PAD_NOTLAST
Padding packet must be last in any pack.

>>> [DVD] ERROR 3106 (ref. DVD-3 Table 5.2.1-2) :
ERR_DVD_SCR_32
SCR_base[32] must be 0.

>>> [DVD] ERROR 3107 (ref. DVD-3 3.3.12.4) :
ERR_DVD_SCR_0
SCR in the first pack of each VOB must be 0.

>>> [DVD] ERROR 3108 (ref. DVD-3 Table 5.2.1-2) :
ERR_DVD_MUXRATE
Pack program_mux_rate must be set to 10.08 Mbps

>>> [DVD] ERROR 3109 (ref. DVD-3 Table 5.2.1-2) :
ERR_DVD_STUFLEN
Pack stuffing_length must be 0. The pack length adjustment method for DVD is:

Number of adjusted data	Adjustment method
1 to 7 bytes	Insert stuffing bytes in packet header
8 bytes or more	Add a padding packet as the last packet in a pack

>>> [DVD] ERROR 3111 (ref. DVD-3 5.2.2) :
ERR_DVD_NV_PCK_NOT1ST
The navigation pack must be aligned to the first pack of the VOBU.

>>> [DVD] ERROR 3112 (ref. DVD-3 5.2.2) :
ERR_DVD_NV_PCK_NO_SYSPCDSI
The Navigation pack comprises a pack header, a system header, a PCI packet and a DS1 packet.



>>> [DVD] ERROR 3113 (ref. DVD-3 5.2.2) :

ERR_DVD_ILL_IN_PCK

The Navigation pack may only contain a pack header, a system header, a PCI packet and a DSI packet.

>>> [DVD] ERROR 3121 (ref. DVD-3 Table 5.2.2-1 Note 1) :

ERR_DVD_PACKET_RATE

Only the packet rate of the NV_PCK and the MPEG-2 audio format 2 pack may exceed the packet rate defined in the “Constrained system parameter Program stream” of the ISO/IEC 13818-1.

>>> [DVD] ERROR 3123 (ref. DVD-3 Table 5-2 *1) :

ERR_DVD_SP_TRANSF_RATE

	transfer rate		Note
	Total streams	One stream	
VOB	10.8 Mbps	---	
Video stream	9.80 Mbps	9.80 Mbps	Number of streams = 1
Audio streams	9.80 Mbps	6.144 Mbps	Number of streams = 8 (max)
Sub-picture streams	9.80 Mbps	3.36 Mbps *1	Number of streams = 32 (max)

*1 The restriction on Sub-picture stream in a VOB shall be define by the following rule:

a) For all Sub-picture packs which have the same sub-stream_id (SP_PCK(i)):

$$\text{SCR}(n) \leq \text{SCR}(n+10) - T_{30\text{packs}}$$

Where

n : 1 to (number of SP_PCK(i)s - 10)

SCR(n) : SCR of the n-th SP_PCK(i)

SCR(n+10) : SCR of the 10th SP_PCK(i) after the n-th SP_PCK(i)

$T_{30\text{packs}}$: value of 1316571 ($=27 \times 10^6 \times 30 \times 2048 \times 8 / 10.08 \times 10^6$)

b) For all Sub-picture packs (SP_PCK(all)) in a VOB which may be connected seamlessly with the succeeding VOB:

$$\text{SCR}(n) \leq \text{SCR}(\text{last}) - T_{9\text{packs}}$$

Where

n : 1 to (number of SP_PCK(all)s)

SCR(n) : SCR of the n-th SP_PCK(all)

SCR(last) : SCR of the last pack in the VOB

$T_{9\text{packs}}$: value of 394971 ($=27 \times 10^6 \times 30 \times 2048 \times 9 / 10.08 \times 10^6$)

Note: At least the first pack of the succeeding VOB is not SP_PCK. $T_{9\text{packs}}$ plus $T_{1\text{st}\text{pack}}$ guarantee ten successive packs.

>>> [DVD] INFORMATION 3124 :

ERR_DVD_EMPTY_PACK

Gives information about data in the pack.

4.4.4 DVD System header checks

>>> [DVD] ERROR 3151 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_BOUND_ERR

The system_header's

- audio_bound must be between 0 and 8
- video_bound must be 1

>>> [DVD] ERROR 3152 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_NOT_FIXED

The system_header's fixed_flag must be 0 (variable bit rate).

>>> [DVD] ERROR 3153 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_CSPS_FLAG

The system_header's CSPS_flag must be 0.

>>> [DVD] ERROR 3154 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_LOCK_FLAG_0

The system_header's system_audio_lock_flag and system_video_lock_flag must be 1.

>>> [DVD] ERROR 3155 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_STRID_ILL

In the system_header:

- the stream_id for all Video must be 1011 1001b (0xB9)
- the stream_id for all Audio must be 1011 1000b (0xB8)
- the stream_id for private_1 must be 1011 1101b (0xBD)
- the stream_id for private_2 must be 1011 1111b (0xBF)

>>> [DVD] ERROR 3156 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_STRID_AV

In the system_header:

- the stream_id for all Video must be 1011 1001b (0xB9)
- the stream_id for all Audio must be 1011 1000b (0xB8)
- the stream_id for private_1 must be 1011 1101b (0xBD)
- the stream_id for private_2 must be 1011 1111b (0xBF)

>>> [DVD] ERROR 3157 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_STRID_MISS

All four entries (all Video, all Audio, private_1, private_2) must appear in the system_header.

>>> [DVD] WARNING 3159 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_STRID_ORDER

The order of the entries in the system_header must be

1. all Video streams
2. all Audio streams
3. private_stream_1
4. private_stream_2



>>> [DVD] ERROR 3161 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_BUF_SCALE

The system_header's P-STD_buf_bound_scale must be

- buf_size x 1024 bytes for all video streams
- buf_size x 128 bytes for all audio streams
- buf_size x 1024 bytes for private_stream_1
- buf_size x 1024 bytes for private_stream_2

>>> [DVD] ERROR 3162 (ref. DVD-3 Table 5.2.2-1) :

ERR_DVD_BUF_BOUND

The system_header's P-STD_buf_size_bound must be

- 237568 bytes for all video streams
- 4096 bytes for all audio streams
- 59392 bytes for private_stream_1

The sum of the target buffers for the presentation data defined as private_stream_1 shall be described.

- 2048 bytes for private_stream_2

4.4.5 DVD Packet checks

>>> [DVD] ERROR 3201 (ref. DVD-3 Table 5.2.3-1 e.f.) :

ERR_DVD_PKT_FLAG_1

The following flags must be 0:

- ESCR_flag
- ES_rate_flag
- DSM_trick_mode_flag
- additional_copy_info_flag
- PES_CRC_flag
- PES_private_data_flag
- pack_header_field_flag
- program_packet_sequence_counter_flag
- PES_extension_flag_2

>>> [DVD] ERROR 3202 (ref. DVD-3 Table 5.2.3-1 e.f.) :

ERR_DVD_PKT_FLAG_0

P-STD_buffer_flag must be 1.

>>> [DVD] ERROR 3203 (ref. DVD-3 Table 5.2.3-1 e.f.) :

ERR_DVD_PKT_ILL_SCR_CTRL

PES_scrambling_control must be 0 (or 1 when scrambled).

>>> [DVD] ERROR 3204 (ref. DVD-3 Table 5.2.3-1 e.f.) :

ERR_DVD_PKT_ILL_PSTDTSFLS

PTS_DTS_flags value must be 00b, 10b or 11b.

>>> [DVD] ERROR 3206 (ref. DVD-3 Table 5.2.3-1 e.f. Note 2) :

ERR_DVD_PKT_PES_EXT

PES_extension is only allowed for the first packet of a VOB.

>>> [DVD] ERROR 3207 (ref. DVD-3 Table 5.2.3-1 e.f. Note 2) :

ERR_DVD_PKT_PES_MISSING

PES_extension is expected for the first packet of a VOB.

>>> [DVD] ERROR 3209 (ref. DVD-3 Table 5.2.3-1 e.f.) :
ERR_DVD_PKT_HDRDAT_LEN
PES_header_data_length value shall be between 0 and 20.

>>> [DVD] ERROR 3210 (ref. DVD-3 Table 5.2.3-1 e.f. Note 1) :
ERR_DVD_PKT_PDTS_32
PTS[32] and DTS[32] shall be set to zero.

>>> [DVD] ERROR 3211 (ref. DVD-3 Table 5.2.3-1 e.f.) :
ERR_DVD_PKT_STDBUF_SCALE
P_STD_buffer_scale value shall be set to 1.

>>> [DVD] ERROR 3212 (ref. DVD-3 Table 5.2.3-1 | 5.2.4-3) :
ERR_DVD_PKT_STDBUF_SIZE
P_STD_buffer_size value shall be set to:

- 232 (payload according to ISO 13818-2)
- 46 (payload according to ISO 11172-2)

>>> [DVD] ERROR 3213 (ref. DVD-3 Table 5.2.4-1,2 Note 1 | 5.2.5-1 Note 1) :
ERR_DVD_PKT_STDBUF_MAX_SIZE
PES_packet has a too large P_STD_buffer_size value ‘number’, should be smaller than ‘number’ bytes.

>>> [DVD] INFORMATION 3214 (ref. MPEG2 2.4.3.6/7 | DVD-3 Table 5.2.3-1) :
ERR_DVD_PKT_PES_SCRAMBLING
PES_packet contains scrambled data. This information message reports that the PES_scrambling_control is set to a value other than ‘0’.

>>> [DVD] ERROR 3216 (ref. DVD-3 Table 5.2.3-1 Note 1) :
ERR_DVD_PKT_NO_PDTS
PTS[32..0] and DTS[32..0] are mandatory in each Video PKT containing the first byte of the picture start code of any I-picture.

>>> [DVD] ERROR 3221 (ref. DVD-3 Table 5.2.3-1) :
ERR_DVD_VPKT_STRID
Video PES_packet stream_id shall be 1110 0000b

>>> [DVD] ERROR 3222 (ref. DVD-3 Table 5.2.3-1 Note 1) :
ERR_DVD_VPKT PTS_NOSTRT
A Video packet shall not contain a PTS, if it does not contain the first byte of a picture start code.

>>> [DVD] ERROR 3224 (ref. DVD-3 Table 5.2.4-1 to 5.2.4-3) :
ERR_DVD_APKT_STRID
Audio PES_packet stream_id shall be:

- 1011 1101b (private_stream_1, Linear PCM, AC-3)
- 1100 0***b (packets containing MPEG1 audio, MPEG-2 audio without extension, MPEG-2 main audio with extension)
- 1101 0***b (packets containing MPEG-2 extension audio)

>>> [DVD] ERROR 3225 (ref. DVD-3 5.2.4) :
ERR_DVD_APKT_STR_NR
The Decoding Audio stream numbers shall not be assigned to the same number regardless of the audio compression mode.



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>>> [DVD] ERROR 3226 (ref. DVD-3 Table 5.2.4-1 to 5.2.4-3 Note 1) :
ERR_DVD_APKT PTS LAST
The Last Audio PES_packet of a VOB shall have no PTS

>>> [DVD] ERROR 3227 (ref. DVD-3 Table 5.2.4-1 to 5.2.4-3 Note 1) :
ERR_DVD_APKT PTS GAP
An Audio PES_packet directly before an audio gap shall have no PTS

>>> [DVD] ERROR 3228 (ref. DVD-3 Table 5.2.4-3 Note 2) :
ERR_DVD_APKT PTS REST
The first A_PKT with the remainder of the previous A_PKT, should have no PTS

>>> [DVD] WARNING 3229 (ref. DVD-3 Table 5.2.4-1 Note 1) :
ERR_DVD_APKT PTS NOSTRT
An Audio packet shall not contain a PTS, if it does not contain the first sample of an audio frame.

>>> [DVD] ERROR 3231 (ref. DVD-3 Table 5.2.5-1 Note 1) :
ERR_DVD_SPKT PTS NOSTRT
A Sub Picture packet shall not contain a PTS, if it does not contain the first data of each Sub Picture Unit.

>>> [DVD] ERROR 3232 (ref. DVD-3 Table 5.2.5-1 Note 1) :
ERR_DVD_SPKT PTS EARLY
The earliest possible value of the PTS of the SPU is the arrival time of the last byte of the SPU in the Sub Picture Buffer.

>>> [DVD] ERROR 3235 (ref. DVD-3 Fig. 5.2.3/4/5-1) :
ERR_DVD_PKT LEN MAX
PES_packet length is ‘number’, resulting in a payload size of ‘number’. This should be at most ‘number’ for stream packets. The maximum payload length for each packet is listed below:

packet type	maximum payload length (bytes)
video	2025
sub-picture	2025
LPCM	2017
AC3	2020
MPEG1 or MPEG-2 without extension	2020
MPEG-2 base	1152
MPEG-2 extension	1584

>>> [DVD] ERROR 3241 (ref. DVD-2 Table 5.2.1-1) :
ERR_DVD_PAD_PKT LEN
The Padding packet length shall be at least 8.

4.4.6 DVD PES checks

>>> [DVD] ERROR 3251 (ref. DVD-3 Table 5.1-1) :

ERR_DVD_PES_STR_STRT

The beginning of each stream shall start from the first byte of each access unit.

>>> [DVD] ERROR 3252 (ref. DVD-3 Table 5.1-1) :

ERR_DVD_PES_STR_END

The end of each stream shall be aligned in each access unit. Therefore, when the pack length comprising the last data in each stream is less than 2048 bytes, it shall be adjusted by either method shown in DVD-3 Table 5.2.1-1.

>>> [DVD] ERROR 3261 (ref. DVD-3 5.4.1.3) :

ERR_DVD_VID_GAP_LEN

The interval between the presentation time of the picture which is stilled by the sequence_end_code and that of the next picture shall be equal or more than 0.4 seconds.

>>> [DVD] ERROR 3262 (ref. DVD-3 5.4.1.3 Restriction 1) :

ERR_DVD_VID_GAP_RATE

The Gap_length shall be an integer multiple of the video fields.

>>> [DVD] ERROR 3263 (ref. DVD-3 5.4.1.3 Restriction 2) :

ERR_DVD_VID_GAP_PARITY

If the Gap_length is a multiple of the video frame(= twice of video field), the last displayed field before the gap and the first displayed field after the gap shall have different field parities. In other cases they will have the same parity.

>>> [DVD] ERROR 3265 (ref. DVD-3 3.3.12.5 / 5.3) :

ERR_DVD_ESTD_UNDERFLOW

The ESTD buffer shall not underflow. (Data read from empty ESTD buffer.)

>>> [DVD] ERROR 3266 (ref. DVD-3 3.3.12.5 / 5.3) :

ERR_DVD_ESTD_OVERFLOW

The ESTD buffer shall not overflow. (Not enough space in ESTD buffer for data written to it.)

>>> [DVD] ERROR 3267 (ref. DVD-3 3.3.12.6) :

ERR_DVD_ESTD_ILL_INPUT

For the ESTD model: No packets shall arrive while STC - STC_offset is < 0.

>>> [DVD] ERROR 3268 (ref. DVD-3 3.3.12.6 / 5.3) :

ERR_DVD_ESTD_ILL_AUDIOGAP

For the ESTD model: Maximum two audio discontinuities (gaps) are allowed in a VOB.

>>> [DVD] ERROR 3269 (ref. DVD-3 3.3.12.6 / 5.3) :

ERR_DVD_ESTD_ILL_AUDIO_INP

For the ESTD model: o audio packets shall arrive while an audio gap is active.

>>> [DVD] ODDITY 3270 (ref. DVD-3 3.3.12.5 / 5.3) :

ERR_DVD_STD_NOT_EMPTY

For non seamless play the STD buffer is expected to be empty when decoding of a new VOB starts.



>>> [DVD] ERROR 3275 (ref. DVD-3 5.2.4.1 (2)) :

ERR_DVD_1ST_MPA_PKT_NONBASE

Audio stream does not start with a base stream packet (expected stream id ‘stream id’), but with a PES packet having a stream_id ‘stream id’

>>> [DVD] ERROR 3276 (ref. DVD-3 5.2.4.1 (2)) :

ERR_DVD_MPA_PKT_ALTER

Audio pack does not have an audio stream ‘extension or base’ stream packet (stream id ‘stream id’) followed by an ‘base or extension’ stream packet (expected stream id ‘stream id’), but by a PES packet having a stream_id ‘stream id’.

>>> [DVD] ERROR 3277 (ref. DVD-3 5.2.4.1 (2)) :

ERR_DVD_MPA_PKT_NRFRMS

The current audio packet (PES stream ‘stream id’) contains more than 1 audio ‘frame type’ frame !

>>> [DVD] ERROR 3278 (ref. DVD-3 5.2.4.1 (2)) :

ERR_DVD_MPA_BASE_EXT_ORDER

Audio stream (PES stream_id ‘stream id’) base and extension frames should alternate : ‘frame type’ frame expected.

4.4.7 DVD Private stream checks

>>> [DVD] SYNTAX ERROR 3301 (ref. DVD-3 Table 5.1.1-2, 5.1.1-3) :

ERR_DVD_PRV_RES_SS_ID

sub_stream_id for private stream_1

sub_stream_id	Stream coding	
001* ****b	Sub-picture stream	*****=Decoding Sub-picture stream number
0100 1000b	reserved	
011* ****b	reserved (for extended Sub-picture)	
1000 0***b	Dolby AC-3 audio stream	***=Decoding audio stream number
1000 1***b	DTS audio stream (option)	***=Decoding audio stream number
1001 0***b	SDDS audio stream (option)	***=Decoding audio stream number
1010 0***b	Linear PCM audio stream	***=Decoding audio stream number
1111 1111b	Provider defined stream	
Others	reserved (for future Presentation Data)	

sub_stream_id for private stream_1

sub_stream_id	Stream coding	
0000 0000b	PCI stream	
0000 0001b	DSI stream	
1111 1111b	Provider defined stream	
Others	reserved (for future Navigation Data)	

Note 1: “reserved” of sub_stream_id means that the sub_stream_id is reserved for future system extension. Therefore, it is prohibited to use reserved values of sub_stream_id.

Note 2: The sub_stream_id whose value is ‘1111 1111b’ may be used for identifying a bitstream which is freely defined by the provider. However, it is not guaranteed that every player will have a feature to play that stream. The restriction of VOB, such as the maximum transfer rate of total streams, shall be applied, if the provider defined bitstream exists in VOB.

4.4.8 DVD Sequence header checks

>>> [DVD] ERROR 3351 (ref. DVD-3 Table 5.4.1.1-1, Table 5.4.1.2-1) :

ERR_DVD_HVSIZE_ILL

Sequence header horizontal_size x vertical_size shall be:

For MPEG-1 video:

TV system	525/60	625/50
horizontal_size x vertical_size	352x240	352x288

For MPEG-2 video:

TV system	525/60	625/50
horizontal_size x vertical_size	720 x 480	720 x 576
	704 x 480	704 x 576
	352 x 480	352 x 576
	352 x 240	352 x 288

>>> [DVD] ERROR 3352 (ref. DVD-3 5.4.1.1.1, 5.4.1.2.1) :

ERR_DVD_WIDTH_CH

Sequence and extension header horizontal_size shall be constant for all VOB's within a VOBS in a volume.

>>> [DVD] ERROR 3353 (ref. DVD-3 5.4.1.1.1, 5.4.1.2.1) :

ERR_DVD_HEIGHT_CH

Sequence and extension header vertical_size shall be constant for all VOBs within a VOBS in a volume.

>>> [DVD] ERROR 3354 (ref. DVD-3 Table 5.4.1.1-1, 5.4.1.2-1) :

ERR_DVD_ASP_RATIO_ILL

Sequence header aspect_ratio shall be:

- pel_aspect_ratio 4:3 for MPEG-1 video,
- Display aspect ratio 4:3 or 16:9 for MPEG-2 video.

>>> [DVD] ERROR 3355 (ref. DVD-3 Table 5.4.1.1-1, 5.4.1.2-1) :

ERR_DVD_FRM_RATE_ILL

Sequence header frame_rate_code shall be:

For MPEG-1 and MPEG-2 video:

TV system	525/60	625/50
frame rate	29.97 Hz	25 Hz

>>> [DVD] ERROR 3356 (ref. DVD-3 5.4.1.1.1, 5.4.1.2.1) :

ERR_DVD_FRM_RATE_CH

Sequence header frame_rate_code shall be identical for all VOBs within a VOBS in a volume.

>>> [DVD] ERROR 3357 (ref. DVD-3 Table 5.4.1.1-1) :

ERR_DVD_CP_FLAG_ILL

Sequence_header contrained_parameter_flag shall be 1



MPEG-1: Permitted combination of horizontal_size, vertical_size, frame_rate and aspect_ratio

horizontal_size	vertical_size	frame_rate	aspect_ratio
352	240	29.97	4:3
352	288	25	4:3

MPEG-2: Permitted combination of horizontal_size, vertical_size, frame_rate and display_aspect_ratio

horizontal_size	vertical_size	frame_rate	aspect_ratio
720	480	29.97	16:9
720	480	29.97	4:3
704	480	29.97	16:9
704	480	29.97	4:3
352	480	29.97	4:3
352	240	29.97	4:3
720	576	25	16:9
720	576	25	4:3
704	576	25	16:9
704	576	25	4:3
352	576	25	4:3
352	288	25	4:3

>>> [DVD] ERROR 3358 (ref. DVD-3 Table 5.4.1.1-2, 5.4.1.2-2) :

ERR_DVD_FRM_VSIZE_ILL

Sequence_header : illegal vertical_size / frame_rate combination

>>> [DVD] ERROR 3359 (ref. DVD-3 Table 5.4.1.1-2, 5.4.1.2-2) :

ERR_DVD_HSIZE_VSIZE_ILL

Sequence_header : illegal horizontal_size / vertical_size combination

>>> [DVD] ERROR 3360 (ref. DVD-3 Table 5.4.1.1-2, 5.4.1.2-2) :

ERR_DVD_ASP_HSIZE_ILL

Sequence_header : illegal aspect_ratio / horizontal_size combination

>>> [DVD] ERROR 3361 (ref. DVD-3 Table 5.4.1.1-2, 5.4.1.2-2) :

ERR_DVD_ASP_PICR_ILL

Sequence_header : illegal aspect_ratio / frame_rate combination

>>> [DVD] ERROR 3365 (ref. DVD-3 5.4.1.2.1) :

ERR_DVD_PROFLEV_ILL

Sequence_extension profile_and_level_indication shall take the value 01001000b (MP@ML) or the value 01011000b (SP@ML).

>>> [DVD] ERROR 3366 (ref. DVD-3 Table 5.4.1.2-1) :

ERR_DVD_SEQ_BIT_RATE_LIM

Sequence_extension bitrate shall hold a constant value, for variable bitrate streams (vbw_delay coded as FFFFh) this shall be the maximum bitrate, it shall be equal or less than 9.80 Mbps.

>>> [DVD] ERROR 3367 (ref. DVD-3 Table 5.4.1.2-1) :

ERR_DVD_LOWDEL_1

Sequence_extension : low_delay should be 0

>>> [DVD] ERROR 3368 (ref. DVD-3 5.4.1.1-1 (*1)) :

ERR_DVD_BIT_RATE_ILL

Sequence_header : Bit_rate_field shall be 3FFFFh when the constrained_parameters_flag is set to 0.

>>> [DVD] ERROR 3370 (ref. DVD-3 5.4.1.2-2 (*2)) :

ERR_DVD_PROG_SEQ_ILL

Sequence_extension : progressive_sequence shall be 1 when the vertical_size equals 240

>>> [DVD] ERROR 3371 (ref. DVD-3 5.4.1.2.1) :

ERR_DVD_DISP_SIZE_ILL

Sequence_display_extension display_horizontal_size value shall be :

When aspect ratio is 16:9

horizontal_size	display_horizontal_size	aspect_ratio_information
720 or 704	720	16:9
720 or 704	540	4:3

When aspect ratio is 4:3

horizontal_size	display_horizontal_size	aspect_ratio_information
720 or 704	720	4:3
352	360	4:3

>>> [DVD] ERROR 3372 (ref. DVD-3 Table 5.4.1.2-5) :

ERR_DVD_DVSIZE_ILL

Sequence_display_extension display_vertical_size value shall be :

vertical_size	display_vertical_size
480	480
240	240
576	576
288	288

>>> [DVD] ERROR 3373 (ref. DVD-3 Table 5.4.1.2-5) :

ERR_DVD_VSIZE_DVSIZE_ILL

Sequence_display_extension : If vertical_size <> 480 or 240 or 576 or 288 then display_vertical_size shall be equal to vertical_size.

>>> [DVD] ERROR 3375 (ref. DVD-3 5.4.1.2 (6)) :

ERR_DVD_SEQEXT_DEF_ILL

Sequence display extension may or may not be present in the stream. The DVD-3 specification redefined the defaults for colour_primaries, transfer_characteristics and matrix_coefficients. If the frame rate is **25 Hz**:

- colour_primaries: The default value for this field shall be 5.
- transfer_characteristics: The default value for this field shall be 5.
- matrix_coefficients: The default value for this field shall be either 5 or 6 .

>>> [DVD] ERROR 3376 (ref. DVD-3 5.4.1.2 (6)) :

ERR_DVD_SEQEXT_DEF_ILL2

Sequence display extension may or may not be present in the stream. The DVD-3 specification redefined the defaults for colour_primaries, transfer_characteristics and matrix_coefficients. If the frame rate is **29.97 Hz**:

- colour_primaries: The default value for this field shall be either 4 or 6.
- transfer_characteristics: The default value for this field shall be either 4 or 6.
- matrix_coefficients: The default value for this field shall be either 5 or 6 .



4.4.9 DVD GOP checks

>>> [DVD] ERROR 3401 (ref. DVD-3 Table 5.4.1.1-1) :

ERR_DVD_NR_PICS_XS

Number of pictures in a GOP shall be:

- 18 display frames or less for TV system 525/60,
- 15 display frames or less for TV system 625/50.

>>> [DVD] ERROR 3402 (ref. DVD-3 5.4.1.4) :

ERR_DVD_NR_DISP_FLD_XS

The number of pictures in a GOP shall be equal to number_of_displayed_field_gop. For:

- **MPEG-2:**
It shall be identical to the number of line21_data() recorded in the following loop,
- **MPEG-1, picture_rate 29.97Hz:**
It shall be equal to the number of pictures multiplied by two.

>>> [DVD] ERROR 3403 (ref. DVD-3 5.4.1.4) :

ERR_DVD_TFFOG_PARITY_GAP

top_field_flag_of_gop shall not have a value such that there is a display field parity gap between previous other first GOPs in VOBUs.

>>> [DVD] ERROR 3404 (ref. DVD-3 5.4.1.4) :

ERR_DVD_USER_DATA_ILL

User data received without receiving Line 21 data.

>>> [DVD] ERROR 3405 (ref. DVD-3 5.4.1.4) :

ERR_DVD_USER_DATA_B_L21

User data received before Line 21 data.

>>> [DVD] ERROR 3406 (ref. DVD-3 5.4.1.4) :

ERR_DVD_L21_DATA_MISS

Line 21 data shall be present after every GOP header.

>>> [DVD] ERROR 3407 (ref. DVD-3 5.4.1.4) :

ERR_DVD_TFFOG_MISMATCH

Line 21 data top_field_flag_of_gop mismatch.

>>> [DVD] ERROR 3408 (ref. DVD-3 5.4.1.4) :

ERR_DVD_L21_DATA_ILL

No Line 21 data shall be recorded for the video gap caused by still pictures

>>> [DVD] ERROR 3409 (ref. DVD-3 5.4.1.4) :

ERR_DVD_NR_LINE21_DATA_XS

More than one user_data() for Line 21 data recorded in GOP.

>>> [DVD] ERROR 3410 (ref. DVD-3 5.4.1.4) :

ERR_DVD_SRSV_ILL

GOP User data for line 21, SRSV setting shall be set to 01F8h.

>>> [DVD] ERROR 3411 (ref. DVD-3 5.4.1.4) :

ERR_DVD_RES_ILL

Reserved_bit shall be 0.

>>> [DVD] ERROR 3412 (ref. DVD-3 5.4.1.4) :

ERR_DVD_MARKER_BITS_ILL
Marker_bits shall be all 1.

>>> [DVD] ERROR 3413 (ref. DVD-3 5.4.1.4) :

ERR_DVD_PARITY_ERR

- The MSB of line21_data1 is an odd parity bit which indicates the parity of the following 7-bits in line21_data1.
- The MSB of line21_data2 is an odd parity bit which indicates the parity of the following 7-bits in line21_data2.

4.4.10 DVD Picture checks

>>> [DVD] ERROR 3451 (ref. DVD-3 5.4.1.2.1) :

ERR_DVD_DISPFCOFF_IL

frame_centre_horizontal_offset may only be different from 0 if the Display mode (in VMGM_V_ATR, VTSM_V_ATR or VTS_V_ATR) is 00b or 01b.

>>> [DVD] ERROR 3452 (ref. DVD-3 5.4.1.2.1) :

ERR_DVD_FRM_HOR_OFF

horizontal size	Permitted range (units 1/16 th sample)
720	-1440 .. +1440
704	-1312 .. +1312

>>> [DVD] ERROR 3453 (ref. DVD-3 5.4.1.2.1) :

ERR_DVD_FRM_VER_OFF

frame_centre_vertical_offset shall always be 0.

>>> [DVD] ERROR 3460 (ref. DVD-3 5.4.1.2-1) :

ERR_DVD_VBV_DELAY_ILL

picture_header: vbv_delay value should be 0xFFFF for DVD.

4.4.11 DVD Audio checks

>>> [DVD] ERROR 3501 (ref. DVD-3 Table 5.4.2.3-1) :

ERR_DVD_AFRM_ID

ID field shall not be set to lower sampling frequencies.

>>> [DVD] ERROR 3502 (ref. DVD-3 Table 5.4.2.3-1) :

ERR_DVD_AFRM_LAYER

Layer shall be layer II.

>>> [DVD] ERROR 3503 (ref. DVD-3 Table 5.4.2.3-1) :

ERR_DVD_PROT_BIT

protection_bit shall be zero.

>>> [DVD] ERROR 3504 (ref. DVD-3 Table 5.4.2.3-1) :

ERR_DVD_AFRM_BITRATE

- Bitrate shall be between 64Kbps and 192Kbps for MPEG-1 and MPEG-2 main stream mono (1 channel).
- Bitrate shall be between 64Kbps and 384Kbps for MPEG-1 and MPEG-2 main stream stereo (2 channel).



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>>> [DVD] ERROR 3505 (ref. DVD-3 Table 5.4.2.3-1) :
ERR_DVD_AFRM_SAMPLFREQ
sampling_frequency shall be 48 kHz only.

>>> [DVD] ERROR 3506 (ref. DVD-3 Table 5.4.2.3-1) :
ERR_DVD_PRIV_BIT
private_bit shall be zero.

>>> [DVD] ERROR 3507 (ref. DVD-3 Table 5.4.2.3-1) :
ERR_DVD_AFRM_EMPH
Emphasis shall always be zero.

>>> [DVD] ERROR 3508 (ref. DVD-3 Table 5.4.2.3-1) :
ERR_DVD_AFRM_MODE
Audio mode is 2 (dual_channel), which is not allowed in DVD.

>>> [DVD] ERROR 3511 (ref. DVD-3 Table 5.4.2.3-1) :
ERR_DVD_SURROUND_MODE
Surround shall be:
• 00b, 01b or 10b for other than karaoke mode,
• 11b for karaoke mode.

>>> [DVD] ERROR 3512 (ref. DVD-3 Table 5.4.2.3-1) :
ERR_DVD_DEMATRIX_PROCEDURE
Dematrix_procedure shall be 11b for unmixed mode, else always MPEG-1 compatible.

>>> [DVD] ERROR 3513 (ref. DVD-3 Table 5.4.2.3-1) :
ERR_DVD_NMLCH
Number of multilingual channels shall be zero.

>>> [DVD] ERROR 3514 (ref. DVD-3 Table 5.4.2.3-1) :
ERR_DVD_EXT_BIT_RATE
• Bitrate shall be up to 528 Kbps for MPEG-2 extension stream.
• Bitrate sum of main plus extension stream shall be up to 912Kbps.

>>> [DVD] ERROR 3515 (ref. DVD-3 5.4.2.3.1) :
ERR_DVD_NO_DRC
Not enough space for dynamic_range_control in audio base frame

>>> [DVD] ERROR 3516 (ref. DVD-3 Table 5.4.2.3-1) :
ERR_DVD_MC_PRED_ON
mc_prediction_on shall be zero.

>>> [DVD] ERROR 3517 (ref. DVD-3 Table 5.4.2.3.2.2) :
ERR_DVD_AUG mtx PROC RES
aug_mtx_proc are two bits to indicate which dematrix procedure has to be applied for 7.1-channel audio signal. Values aug_mtx_proc==2 and aug_mtx_proc==3 are reserved.

>>> [DVD] ERROR 3518 (ref. DVD-3 Table 5.4.2.3.2.2) :
ERR_DVD_AUG_FTR_EXT_RES
aug_future_ext is for future extension, it should be zero

>>> [DVD] ERROR 3519 (ref. DVD-3 Table 5.4.2.3.2.2) :
 ERR_DVD_DYNX_MODE7_FB
 DynX_mode7 shall be at most 18.

>>> [DVD] ERROR 3520 (ref. DVD-3 5.4.2.3.1) :
 ERR_DVD_DRC_RES_ILL
 Reserved dynamic_range_control bits shall be '0'.

>>> [DVD] ERROR 3521 (ref. DVD-3 5.4.2.3.1) :
 ERR_DVD_DRC_Y_ILL
 Dynamic_range_control-Y component shall not exceed maximum 29.

4.4.12 DVD SPU checks

>>> [DVD] SYNTAX ERROR 3601 (ref. DVD-3 5.4.3.1 (1)) :
 ERR_DVD_SPU_SIZE_0
 SP unit size shall be > 0.

>>> [DVD] ERROR 3602 (ref. DVD-3 5.4.3.1 (1)) :
 ERR_DVD_SPU_SIZE_ODD
 SP unit size shall be even !

>>> [DVD] SYNTAX ERROR 3603 (ref. DVD-3 5.4.3.1 (1)) :
 ERR_DVD_SPU_SIZE_ERR
 SP unit size shall describe the size of a SPU in number of bytes.

>>> [DVD] ERROR 3604 (ref. DVD-3 5.4.3.1 (1)) :
 ERR_DVD_SPU_SIZE
 SP unit size shall be <= 53220 bytes.

>>> [DVD] ERROR 3605 (ref. DVD-3 5.4.3.1 (1)) :
 ERR_DVD_SPU_DCSQT_SIZE
 The size of SP_DCSQT in a SPU shall be equal or less than half the size of the SPU.

>>> [DVD] SYNTAX ERROR 3611 (ref. DVD-3 5.4.3.1 (2)) :
 ERR_DVD_SPU_DCSQTA_0
 DCSQT_SA shall be > 0.

>>> [DVD] SYNTAX ERROR 3612 (ref. DVD-3 5.4.3.1 (2)) :
 ERR_DVD_SPU_DCSQTA
 SP_DCSQT_SA describes the start address of SP_DCSQT with RBN from the first byte of the SPU.

>>> [DVD] SYNTAX ERROR 3616 (ref. DVD-3 5.4.3.2 c)) :
 ERR_DVD_SPU_PXD_XSIZE
 Decoded PXD width shall be as set by SET_DAREA in SP_DCCMD.

>>> [DVD] ODDITY 3617 (ref. DVD-3 5.4.3.2 c)) :
 ERR_DVD_SPU_PXD_XYSIZE
 Decoded PXD size shall be as set by SET_DAREA in SP_DCCMD.



>>> [DVD] ERROR 3618 (ref. DVD-3 5.4.3.2 c)) :
ERR_DVD_SPU_PXD_XSIZE_MIS
 PXD width of display area and bitmap pixel data shall be the same.
>>> [DVD] ERROR 3619 (ref. DVD-3 5.4.3) :
ERR_DVD_SPU_NO_PXD
 PXD data shall be present.

>>> [DVD] SYNTAX ERROR 3621 (ref. DVD-3 5.4.3.3) :
ERR_DVD_SPU_DCSQT_0
 SPU shall contain at least 1 DCSQ

>>> [DVD] ERROR 3622 (ref. DVD-3 5.4.3.3 (1)) :
ERR_DVD_SPU_DCSQ_STM_0
 The SP_DCSQ_STM in the first SP_DCSQ shall be 0.

>>> [DVD] ERROR 3623 (ref. DVD-3 5.4.3.3) :
ERR_DVD_SPU_DCSQ_STM_ORD
 SP_DCSQ i and SP_DCSQ j (i<j) shall be described in execution order (DCSQ_STM i < DCSQ_STM j).

>>> [DVD] ERROR 3624 (ref. DVD-3 5.4.3.3) :
ERR_DVD_SPU_DCSQ_STM_DUP
 SP_DCSQ i and SP_DCSQ j (i>j) shall not have the same execution start times.

>>> [DVD] ERROR 3625 (ref. DVD-3 5.4.3.3 (1)) :
ERR_DVD_SPU_DCSQ_STM_ILL
 SP_DCSQ_STM shall be 0 or the positive integer value which is calculated by:

- (225 x n) / 64 (in case of TV system with 625/50)
- (3003 x n) / 1024 (in case of TV system with 525/60)

>>> [DVD] ERROR 3626 (ref. DVD-3 5.4.3.3 (2)) :
ERR_DVD_SPU_DCSQ_SA_NON
 For the last SP_DCSQ entry, DCSQ_SA shall point to itself.

>>> [DVD] ERROR 3627 (ref. DVD-3 5.4.3.3 (2)) :
ERR_DVD_SPU_DCSQ_SA_NXT
 SP_NXT_DCSQ_SA shall point to the RBN address of the next DCSQ entry.

>>> [DVD] SYNTAX ERROR 3628 (ref. DVD-3 5.4.3) :
ERR_DVD_SPU_DCSQ_PADD
 Undefined data was found after the last SP_DCSQ.

>>> [DVD] ERROR 3631 (ref. DVD-3 5.4.3.3 (3)) :
ERR_DVD_SPU_DCCMD_0
 SP_DCSQ shall contain at least 1 DCCMD

>>> [DVD] ERROR 3632 (ref. DVD-3 5.4.3.3 (3)) :
ERR_DVD_SPU_DCCMD_DUP
 The same SP_DCCMD shall not be described more than once.

>>> [DVD] ERROR 3634 (ref. DVD-3 Annex L) :
ERR_DVD_SPU_DCCMD_MIS

- Either FSTA_DSP or STA_DSP shall be described in the SP_DCSQ#0.
- SET_COLOR, SET_CONTR, SET_DAREA and SET_DSPXA shall be described in the SP_DCSQ#0.
- CMD_END shall be described.

>>> [DVD] ERROR 3635 (ref. DVD-3 Annex L) :

ERR_DVD_SPU_DCCMD_SIM

Two or more commands in FSTA_DSP, STA_DSP and STP_DSP shall not be described simultaneously in a SP_DCSQ.

>>> [DVD] ODDITY 3636 :

ERR_DVD_SPU_DCCMD_NO_PXD

A DCCMD was found in SP_DCSQ, but no PXD was found.

>>> [DVD] ERROR 3639 (ref. DVD-3 Annex L) :

ERR_DVD_SPU_DCCMD_END

The last DCCMD in a SP_DCSQ shall be CMD_END.

>>> [DVD] ERROR 3641 (ref. DVD-3 5.4.3.4 (6)) :

ERR_DVD_SPU_DCCMD_DAREA_CO

The origin of the Y-co-ordinate is SP line number 0. The origin of the X-co-ordinate is the starting point of the SP line number 0.

- X-co-ordinate values shall be in the range 0 to 719 inclusive.
- Y-co-ordinate values shall be in the range 2 to 479 inclusive for TV system 525/60.
- Y-co-ordinate values shall be in the range 2 to 574 inclusive for TV system 625/50.

>>> [DVD] ODDITY 3642 (ref. DVD-3 5.4.3.2) :

ERR_DVD_SPU_DCCMD_DSPXA_ORD

SET_DSPXA top field data address shall be lower than the bottom field address.

>>> [DVD] ERROR 3643 (ref. DVD-3 5.4.3.4 (7)) :

ERR_DVD_SPU_DCCMD_DSPXA_ADD

SET_DSPXA shall point to the first pixel of a run-length coded PXD line.

>>> [DVD] ERROR 3651 (ref. DVD-3 5.4.3.3 (1)) :

ERR_DVD_SPU_DCSQ_STM PTS

Last DCSQ_STM shall be equal to or smaller than the PTS of the next SPU minus 1 video frame period.

>>> [DVD] ERROR 3652 (ref. DVD-3 5.1-1) :

ERR_DVD_SPU_DCSQ_STM_SVOB

The PTS of the first SPU is ‘PTS value’, but should be equal to or more than the VOB_V_S_PTM which is ‘VOB_V_S_PTM value’.

>>> [DVD] ERROR 3653 (ref. DVD-3 5.1-1) :

ERR_DVD_SPU_DCSQ_STM_EVOB

The last PTM of the last SPU is ‘PTM value’ (PTS ‘PTS value’ + last_SP_DCSQ_STM*1024 ‘value’ + video frame period ‘value’), but should be equal to or less than the VOB_V_E_PTM which is ‘VOB_V_E_PTM value’.

>>> [DVD] ERROR 3654 (ref. DVD-3 5.1-1) :

ERR_DVD_SPU_DCSQ_STM_ECEL

The last PTM of the last SPU is ‘PTM value’ (PTS ‘PTS value’ + last_SP_DCSQ_STM*1024 ‘value’ + video frame period ‘value’), but should be equal to or less than the Cell’s presentation end time ‘presentation time value’.



>>> [DVD] ERROR 3655 (ref. DVD-3 Annex L) :

ERR_DVD_SPU_DCCMD_ILL

For SP_DCSQ which is controlled by Highlight Information:

- CHG_COLCON shall not be described in any SP_DCSQ.
- STA_DSP shall not be described in any SP_DCSQ.
- SET_COLOR, SET_CONTR, SET_DAREA, SET_DSPXA and FSTA_DSP shall not be described in SP_DCSQ other than in the first SP_DCSQ.
- STP_DSP shall not be described in SP_DCSQ other than in the last SP_DCSQ.

>>> [DVD] ERROR 3656 (ref. DVD-3 Annex L) :

ERR_DVD_SPU_STA_DSP_INSYS

STA_DSP shall not be described in any SP_DCSQ in system space.

>>> [DVD] ERROR 3657 (ref. DVD-3 5.4.3.3 (6)) :

ERR_DVD_SPU_DCCMD_DAREA_YODD

SET_DAREA command Start Y-co-ordinate shall be even.

>>> [DVD] ERROR 3661 (ref. DVD-3 5.4.3.4.1 (1)) :

ERR_DVD_SPU_COLON_Y

CHG_COLCON command LN_CTLI, change line number shall be within:

- 2 .. 479 (TV system with 525/60)
- 2 .. 574 (TV system with 625/50)

>>> [DVD] ERROR 3662 (ref. DVD-3 5.4.3.4.1 (1)) :

ERR_DVD_SPU_COLCON_CHNR

CHG_COLCON command LN_CTLI Number_of_changes shall be within 1..8.

>>> [DVD] ERROR 3663 (ref. DVD-3 5.4.3.4.1 rule 1) :

ERR_DVD_SPU_COLCON_TERM

CHG_COLCON LN_CTLI Change termination line shall be greater or equal than the start line.

>>> [DVD] ERROR 3664 (ref. DVD-3 5.4.3.4.1 rule 2)) :

ERR_DVD_SPU_COLCON_STRT

CHG_COLCON LN_CTLI Change start line shall be larger than the previous LN_CTLI termination line.

>>> [DVD] ERROR 3665 (ref. DVD-3 5.4.3.4.1 rule 3)) :

ERR_DVD_SPU_COLCON_LN_ORD

CHG_COLCON LN_CTLI Change start line shall be in ascending order, thus larger than the previous LN_CTLI start lines.

>>> [DVD] ERROR 3666 (ref. DVD-3 5.4.3.4.1 rule 4)) :

ERR_DVD_SPU_COLCON_PX_ORD

CHG_COLCON LN_CTLI : In the group of PX_CTLI's immediately following each LN_CTLI, the change start pixel numbers in PX_CTLI shall be described in ascending order.

>>> [DVD] ERROR 3667 (ref. DVD-3 5.4.3.4.1 (2)) :

ERR_DVD_SPU_COLCON_PX_N8

CHG_COLCON LN_CTLI: At least 8 pixels with the same content shall be continued on the change start pixel and the pixels which follow.

>>> [DVD] SYNTAX ERROR 3671 (ref. DVD-3 5.4.3.1 (1)) :

ERR_DVD_SPU_PAD

SPU even size padding byte shall be 0xff .

>>> [DVD] ERROR 3672 (ref. DVD-3 5.4.3 Fig 5.4.3-2) :

ERR_DVD_SPU_PAD_PKT

A SP_PCK may have a padding packet, only when it is the last pack for a SPU.

>>> [DVD] ERROR 3673 (ref. DVD-3 5.4.3 Fig 5.4.3-2) :

ERR_DVD_SPU_STUFF

A SP_PCK packet may have stuffing bytes, only when it is the last packet for a SPU.

>>> [DVD] SYNTAX ERROR 3681 (ref. DVD-3 5.4.3.2 (a) 1-5) :

ERR_DVD_PXD_NPIX

- If 1 to 3 pixels with the same value follow, enter the number of the pixels followed in the first 2 bits and the pixel data in the following 2 bits. The 4 bits are considered to be one unit.
- If 4 to 15 pixels with the same value follow, specify 0 in the first 2 bits and enter the number of the pixels in the following 4 bits and the pixel data in the next 2 bits. The 8 bits are considered to be one unit.
- If 16 to 63 pixels with the same value follow, specify 0 in the first 4 bits and enter the number of the pixels in the following 6 bits and the pixel data in the next 2 bits. The 12 bits are considered to be one unit.
- If 64 to 255 pixels with the same value follow, specify 0 in the first 6 bits and enter the number of the pixels in the following 8 bits and the pixel data in the next 2 bits. The 16 bits are considered to be one unit.
- If the same pixels follow to the end of a line, specify 0 in the first 14 bits and describe the pixel data in the next 2 bits. The 16 bits are considered to be one unit.

>>> [DVD] SYNTAX ERROR 3685 (ref. DVD-3 5.4.3.2 (a) 7)) :

ERR_DVD_PXD_LINE_LONG

The size of the run-length coded data within one line shall be 1440 bits or less.

>>> [DVD] SYNTAX ERROR 3699 (ref. DVD-3) :

ERR_DVD_PRIV1_BITS_OVER

Packet parsing shall terminate with no bits left over !

4.4.13 AC-3 Checks

>>> [DVD] ERROR 3840 (ref. [AC-3] 7.10.2 (17)) :

ERR_DVD_AC3_PARSER_EXP_TOO_LARGE

While decoding packed exponents, the parser has encountered a packed exponent that is larger than 124, which is not allowed.

>>> [DVD] ERROR 3842 (ref. [AC-3] 5.4.3.11 + 5.4.3.12) :

ERR_DVD_AC3_PARSER_CPLBEGF_ERR

The parser detected that cplbegf is larger than cplendif + 2.

Since these values are used to calculate the number of coupling sub bands, the result will become negative, which is not allowed.

>>> [DVD] ERROR 3844 (ref. [AC-3] 5.4.4.1) :

ERR_DVD_AC3_PARSER_AUXDATA_NEG

The calculated size of the auxdata block resulted in a negative value. Probably caused by an 'out of sync' problem in one of the previous audio blocks.



>>> [DVD] INFORMATION 3846 (ref. [AC-3] 5.4.1.1) :
ERR_DVD_AC3_PARSER_RECOVER
The parser encountered an error and skipped the remaining bits
of the current frame until the next syncword is encountered.

>>> [DVD] ERROR 3752 (ref. [AC-3] 5.4.1.1) :
ERR_DVD_AC3_SYNCWORD
The syncword should always be '0x0B77'.

>>> [DVD] ERROR 3754 (ref. [AC-3] 5.4.1.3) :
ERR_DVD_AC3_FSCOD_RESERVED
The fscod contains a reserved value.
Value '3' is reserved.

>>> [DVD] ERROR 3756 (ref. [AC-3] 5.4.1.4) :
ERR_DVD_AC3_FRMSIZECOD_ILL
The frmsizecod should range between 0 and 18.

>>> [DVD] ERROR 3762 (ref. [AC-3] 5.4.2.4) :
ERR_DVD_AC3_CMIXLEV_RESERVED
The cmixlev contains a reserved value.
Value '3' is reserved.

>>> [DVD] ERROR 3764 (ref. [AC-3] 5.4.2.5) :
ERR_DVD_AC3_SURMIXLEV_RESERVED
The surmixlev contains a reserved value.
Value '3' is reserved.

>>> [DVD] ERROR 3766 (ref. [AC-3] 5.4.2.6) :
ERR_DVD_AC3_DSURMOD_RESERVED
The dsurmod contains a reserved value.
Value '3' is reserved.

>>> [DVD] ERROR 3768 (ref. [AC-3] 5.4.2.15) :
ERR_DVD_AC3_ROOMTYP_RESERVED
The roomtyp contains a reserved value.
Value '3' is reserved.

>>> [DVD] ERROR 3770 (ref. [AC-3] 5.4.2.23) :
ERR_DVD_AC3_ROOMTYP2_RESERVED
The roomtyp2 contains a reserved value.
Value '3' is reserved.

>>> [DVD] ERROR 3772 (ref. [AC-3] 5.4.2.27) :
ERR_DVD_AC3_TIMECOD1_HRS_ILL
The time in hours (bits 1..5) of timecod1 should range between 0 and 23.

>>> [DVD] ERROR 3774 (ref. [AC-3] 5.4.2.27) :
ERR_DVD_AC3_TIMECOD1_MINS_ILL
The time in minutes (bits 6..11) of timecod1 should range between 0 and 59.

>>> [DVD] ERROR 3776 (ref. [AC-3] 5.4.2.28) :
ERR_DVD_AC3_TIMECOD2_FRMS_ILL
The time in frames (bits 4..8) of timecod2 should range between 0 and 29.

>>> [DVD] ERROR 3780 (ref. [AC-3] 7.10.2.(1)) :

ERR_DVD_AC3_CPLSTRE_ILL

The Coupling strategy (cplstre) should exist in the first audio block.

>>> [DVD] ERROR 3782 (ref. [AC-3] 7.10.2.(2)) :

ERR_DVD_AC3_NRCPLCHNS_IS_ZERO

The cplinu flag is set, but no channel is in coupling.

>>> [DVD] ERROR 3784 (ref. [AC-3] 7.10.2.(3)) :

ERR_DVD_AC3_CPLBEGF_TOO_LARGE

While cplinu is set, cplbegf should not be larger than cplendif+2.

However, when the parser detects that cplbegf is larger than cplendif, it is most likely that an error occurred. Because these fields are used in further bit allocation calculations, this error will lead to more serious parse errors. Therefore the parser will call the recover function to skip the current frame until the next syncword is encountered.

>>> [DVD] ERROR 3786 (ref. [AC-3] 7.10.2.(4)) :

ERR_DVD_AC3_COUPLING_ILL

When a channel is in coupling, the Coupling coordinates should be transmitted in the first audio block, or the previous cplinu should be '0'.

>>> [DVD] ERROR 3788 (ref. [AC-3] 7.10.2.(5)) :

ERR_DVD_AC3_REMATSTR_ILL

No rematrix flags found in 2/0 audio.

>>> [DVD] ERROR 3790 (ref. [AC-3] 7.10.2.(6)) :

ERR_DVD_AC3_CPLEXPSTR_ILL

Coupling exponent strategy cannot specify 'reuse' in the first audio block or when the previous cplinu is '0'.

>>> [DVD] ERROR 3792 (ref. [AC-3] 7.10.2.(7)) :

ERR_DVD_AC3_CPLBEGF_DIFF

When coupling exponent strategy specifies 'reuse', cplbegf should equal the previous cplbegf.

>>> [DVD] ERROR 3794 (ref. [AC-3] 7.10.2.(7)) :

ERR_DVD_AC3_CPLENDF_DIFF

When coupling exponent strategy specifies 'reuse', cplendif should equal the previous cplendif.

>>> [DVD] ERROR 3796 (ref. [AC-3] 7.10.2.(8)) :

ERR_DVD_AC3_CHEXPSTR_ILL

The Channel exponent strategy cannot specify 'reuse' in the first audio block.

>>> [DVD] ERROR 3798 (ref. [AC-3] 7.10.2.(9)) :

ERR_DVD_AC3_CH_CPLBEGF_DIFF

When the channel exponent strategy specifies 'reuse', cplbegf should equal the previous cplbegf.

>>> [DVD] ERROR 3800 (ref. [AC-3] 7.10.2.(10)) :

ERR_DVD_AC3_LFEEXPSTR_ILL

The Lfe exponent strategy cannot specify 'reuse' in the first audio block when lfeon is set.

>>> [DVD] ERROR 3802 (ref. [AC-3] 7.10.2.(11)) :



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ERR_DVD_AC3_CHBWCOD_TOO_LARGE
 Chbwcod should range between '0-60'.

>>> [DVD] ERROR 3804 (ref. [AC-3] 7.10.2.(12)) :
ERR_DVD_AC3_BAIE_ILL
 The 'bit allocation exists' (baie) should be set for the first audio block.

>>> [DVD] ERROR 3806 (ref. [AC-3] 7.10.2.(13)) :
ERR_DVD_AC3_SNROFFSTE_ILL
 'SNR offset exists' (snroffste) should be set for the first audio block.

>>> [DVD] ERROR 3810 (ref. [AC-3] 7.10.2.(14)) :
ERR_DVD_AC3_CPLLEAKE_ILL
 'Coupling leak initialization exists' (cplleake) should be set when cplinu is set
 for the first audio block.

>>> [DVD] ERROR 3830 (ref. DVD-3 Table 5.2.4-2 Note 3) :
ERR_DVD_AC3_NUM_FRAMEHEAD
 The number_of_frame_headers should describe the number of audio frames whose first byte is in this
 A_PKT.

>>> [DVD] ERROR 3831 (ref. DVD-3 Table 5.2.4-2 Note 4) :
ERR_DVD_AC3_FIRST_AUPTR_ILL
 The first_access_unit_pointer should describe the address of the first byte of the first AU in this A_PCK,
 with the RBN from the last byte of this field, but the first AU was found at RBN 'value'.

>>> [DVD] ERROR 3835 (ref. [AC-3] 7.10.1) :
ERR_DVD_AC3_PARSER_CRC_5_8_ERR
 The CRC 'CRC value' at 5/8 of the frame should be 0. The frame is probably corrupt and might have, or
 could lead to other parser errors.

>>> [DVD] ERROR 3836 (ref. [AC-3] 7.10.1) :
ERR_DVD_AC3_PARSER_CRC_FULL_ERR
 The CRC 'CRC value' at the end of the frame should be 0. The frame is probably corrupt and might have
 caused other parser errors.

>>> [DVD] ERROR 3837 (ref. [AC-3] 5.4.1.1) :
ERR_DVD_AC3_PARSER_INCOMPLETE_FRAME
 Incomplete AC3 frame. The AC3 parser tried to parse more data than the length of the AC3 frame, indicated
 by the framecode. The AC3 parser will continue pasring the CRC error check at the end of the AC3 frame.

4.4.13.1 **LPCM Private-1 Header Checks**

The LPCM Private-1 Header checks are immediate checks. These checks are performed directly after the
 Private-1 header for LPCM packets is parsed.

>>> [DVD] ERROR 3851 (ref. DVD-3 Table 5.2.4-1) :
ERR_DVD_PR1H_RESERVED
 Reserved fields in the Private-1 header of LPCM audio should describe '0'.

>>> [DVD] ERROR 3852 (ref. DVD-3 Table 5.2.4-1) :
ERR_DVD_PR1H_RESERVED_VALUE
 The specified field in the Private-1 header of LPCM audio should describe a non-reserved value. This error is
 reported when:

- quantization_word_length specifies the value '11b'.
- audio_sampling_frequency specifies the value '10b' or '11b'.

>>> [DVD] ERROR 3853 (ref. DVD-3 Table 5.2.4-1 note 5) :

ERR_DVD_PR1H_EMPH_ILL

When the `audio_sampling_frequency` describes 96 kHz, the value of the `audio_emphasis_flag` should be ‘0b’, describing ‘emphasis off’.

>>> [DVD] ERROR 3854 (ref. DVD-3 Table 5.2.4-1 note 7) :

ERR_DVD_PR1H_FRM_NUM

The `audio_frame_number` should describe a number between ‘0’ and ‘19’.

>>> [DVD] ODDITY 3855 (ref. DVD-3 Table 5.2.4-1) :

ERR_DVD_PR1H_FRM_NUM_ILL

The `audio_frame_numbers` should be assigned consecutively. This error reports that a non-consecutive `audio_frame_number` was found. This means that when an audio frame number was skipped or used twice this error is reported, but when only the current `audio_frame_number` is invalid, this error will be reported twice, as shown below.

Audio frames:									
audio_frame_number	1	2	11	4	5	6	8	9	10
error generated		x		x			x		
correct value			3	!			7	(8)	(9)

As this constraint is not explicitly specified in the [DVD-3] specification, this error is reported as an ODDITY.

>>> [DVD] ERROR 3856 (ref. DVD-3 Table 5.2.4-1 note 7/5.4.2-1 (a)) :

ERR_DVD_PR1H_GOF_ILL

The `audio_frame_number` ‘0’ should not be used when the GOF contains less than 20 audio frames, as `audio_frame_number` ‘0’ is reserved for the beginning of a GOF and each GOF should consist of 20 audio frames(except for the last GOF in a VOB, which can consist of less than 20 audio frames).

This error reports that the verifier found a GOF that consists of less than 20 audio frames, but is not the last GOF of a VOB. This check is performed at the start of the next GOF and therefore will report a violation of the previous GOF.

>>> [DVD] ERROR 3857 (ref. DVD-3 Table 5.2.4-1 note 11) :

ERR_DVD_PR1H_DRC_YLARGE

The ‘Y’ component of the `dynamic_range_control` value, should describe a number between ‘0’ and ‘29’. The ‘Y’ component of the `dynamic_range_control` value is defined as the 5 LSB bits (meaning a maximum value of 31) from the `dynamic_range_control` field in the Private-1 header for LPCM.

4.4.13.2 LPCM Audio Checks

The LPCM Audio checks are delayed checks. These checks are performed at the end of an Audio Pack.

>>> [DVD] ERROR 3870 (ref. DVD-3 Table 5.2.4-1 note 3) :

ERR_DVD_LPCM_NUM_FRMHEAD

The `number_of_frame_headers` should describe the number of audio frames whose first byte is in this A_PCK. This field, which is found in the Private-1 header for LPCM, is checked at the end of the A_PCK. Only at this moment can be determined if the specified number of audio frames started in the A_PCK.

>>> [DVD] ERROR 3871 (ref. DVD-3 Table 5.2.4-1 note 4) :

ERR_DVD_LPCM_FIRST_AUPTR_ILL

The `first_access_unit_pointer` should describe the address of the first byte of the first AU in this A_PCK, with the RBN from the last byte of this information. This field, which is found in the Private-1



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header for LPCM, is checked at the end of the A_PCK. Only at this moment can be determined if the specified start address of the start of the first audio frame was correct.

>>> [DVD] ERROR 3872 (ref. DVD-3 Table 5.2.4-1 note 4) :

ERR_DVD_LPCM_FIRST_AUPTR_NOT_NULL

When the first byte of the first AU does not exist in this A_PCK, the first_access_unit_pointer should describe ‘0000 0000h’. This field, which is found in the Private-1 header for LPCM, is checked at the end of the A_PCK. Only at this moment can be determined if no audio frame started in the current A_PCK.

>>> [DVD] ERROR 3873 (ref. DVD-3 Table 5.2.4-1 note 7) :

ERR_DVD_LPCM_FRM_NUM_NA

The audio_frame_number should only specify ‘11111b’, when no AU starts in the current A_PCK. This value is reserved for an audio frame when no first byte of any AU is present. This field, which is found in the Private-1 header for LPCM, is checked at the end of the A_PCK. Only at this moment can be determined if no audio frame started in the current A_PCK.

>>> [DVD] ERROR 3874 (ref. DVD-3 5.2.4 note 6) :

ERR_DVD_LPCM_MUTE_ON_DATA_ILL

When the flag audio_mute_flag specifies ‘Mute On’, all data from the A_PKT shall be zero. This check is not implemented because the validity is not clear.

>>> [DVD] ERROR 3875 (ref. DVD-3 5.4.2.1-2) :

ERR_DVD_LPCM_DATA_SIZE

Number_of_channels is too large in combination with the fs and quantisation (see [DVD-3] Table 5.4.2.1-2). The Number_of_channels should comply to this table. According to this table, there is a limit to the number of channels and bits per sample in combination with the sample frequency:

<i>fs (kHz)</i>	<i>quantization (bits)</i>	16	20	24
48		8	6	5
96		4	3	2

Table 1: Maximum number of audio_channels for any quantization/fs combination.

4.4.14 DVD VMG checks

>>> [DVD] ERROR 4001 (ref. DVD-3 4.1.1 / BP 12) :

ERR_DVD_VMG_EA_ILLEGAL

The value specified in the VMG_EA field contained an illegal value.

>>> [DVD] ERROR 4002 (ref. DVD-3 4.1.1 / BP 12) :

ERR_DVD_VMG_EA_SMALL

The value specified in the VMG_EA field was smaller than the value of the VMGI_EA field. Since the VMGI is a part of the VMG, this is illegal.

>>> [DVD] SYNTAX ERROR 4003 (ref. DVD-3 4.1.1) :

ERR_DVD_WRONG_OR_NO_VMGI

Input file error, probably caused by a non-VMGI stream being fed to the parser.

>>> [DVD] INFORMATION 4005 (ref. DVD-3 4.1.1 / BP 192) :

ERR_DVD_VOBS_FOUND

VMGI_MAT: Video Objects were found in the VMGI

>>> [DVD] ERROR 4010 (ref. DVD-3 4.1.1) :

ERR_DVD_RESERVED_BLOCK_ILL

A number of bits in a block of reserved fields were non-zero.

These blocks are not parsed, but only skipped and checked for a non-zero value. These blocks of reserved fields are generally more than 4 bytes long and as such identified in the specification.

>>> [DVD] ERROR 4011 (ref. DVD-3 2.1) :

ERR_DVD_RESERVED_FIELD_ILL

All reserved fields should have all their bits cleared.

>>> [DVD] ERROR 4012 (ref. DVD-3 4.1.1) :

ERR_DVD_RESERVED_VALUE_ILL

A field specified a value that is reserved (i.e. not to be used).

>>> [DVD] ERROR 4013 (ref. DVD-3 4.1.1 / BP 0) :

ERR_DVD_VMG_ID_INVALID

The VMG_ID field should describe ‘DVDDVIDEO-VMG’ to identify the VMGI file. Only characters from the ISO646 (a-characters) are allowed. This message indicates that this field did not specify the correct string and could indicate an input-stream other than a VMGI.

>>> [DVD] ERROR 4014 (ref. DVD-3 4.1.1 / BP 32) :

ERR_DVD_VERN_INVALID

The VERN (Version number of DVD Video Specifications) field should specify ‘00010000b’, other values are prohibited.

>>> [DVD] ERROR 4015 (ref. DVD-3 4.1.1) :

ERR_DVD_NS_TOO_SMALL

A number field was found that specified the number ‘0’. This message refers to all the number fields that have a legal range starting from ‘1’, e.g. VTS_Ns, VMGM_AST_Ns, etc.

>>> [DVD] ERROR 4016 (ref. DVD-3 4.1.1) :

ERR_DVD_NS_TOO_LARGE

A number field was found that specified a number larger than ‘99’. This message refers to all the number fields that have a maximum value ‘99’, e.g. VTS_Ns, VMGM_AST_Ns, etc.

>>> [DVD] ERROR 4020 (ref. DVD-3 4.1.1 / BP 64) :

ERR_DVD_ID_NON_A_CHARACTER

This error is reported for the VMG_ID and the PVR_ID fields. It indicates that some characters from the field were not from the a-characters set according to the ISO646 charactercode table. The definition of these a-characters can be found in [DVD-2] Chapter 1.5.3.

>>> [DVD] ERROR 4021 (ref. DVD-3 4.1.1 / BP 0/ BP 64) :

ERR_DVD_ID_ISO646_ILLEGAL

This error is reported for the VMG_ID and the PVR_ID fields. It indicates that some characters from the field were illegal according to the ISO646 charactercode table, i.e. characters with charactercode exceeding ‘127’.

>>> [DVD] ERROR 4022 (ref. DVD-3 4.1.1 /BP 0/ BP 64) :

ERR_DVD_ID_NON_PRINTABLE

This error is reported for the VMG_ID and the PVR_ID fields. It indicates that some characters from the field were non-printable, e.g. Linefeed, Backspace, Carriage return, etc.

>>> [DVD] ODDITY 4023 (ref. DVD-3 4.1.1 / BP 64) :

ERR_DVD_ID_NULL

This checks if the PVR_ID field contains data. If all the bytes from this field are ‘0’, this ODDITY will be generated.



PHILIPS

>>> [DVD] ERROR 4025 (ref. DVD-3 4.1.1 / BP 128) :

ERR_DVD_VMGI_MAT_TOO_LARGE

The VMGI_MAT_EA was too large. The maximum size of the VMGI_MAT is '2291' ('08F3h') bytes. Therefore, the maximum value of the VMGI_MAT_EA field is '2290' ('08F2h').

>>> [DVD] ERROR 4026 (ref. DVD-3 4.1.1 / BP 128) :

ERR_DVD_VMGI_MAT_TOO_SMALL

The VMGI_MAT_EA was too small. The minimum size of the VMGI_MAT is '1024' ('0400h') bytes. Therefore, the minimum value of the VMGI_MAT_EA field is '1023' ('03FFh').

>>> [DVD] ERROR 4027 (ref. DVD-3 4.1.1 / BP 128) :

ERR_DVD_VMGI_MAT_ILL

The VMGI_MAT_EA should be '1023' ('03FFh') when no FP_PGCI exists in the VMGI_MAT.

>>> [DVD] ERROR 4028 (ref. DVD-3 4.1.1 / BP 132) :

ERR_DVD_FP_PGCI_SA_ILL

The FP_PGCI_SA should be '1024' ('0400h') when a FP_PGCI exists in the VMGI_MAT. No other start address may be specified.

>>> [DVD] ERROR 4029 (ref. DVD-3 4.1.1 / BP 132) :

ERR_DVD_VMGI_NO_FP_PGCI

No FP_PGCI specified in the VMGI_MAT of this VMGI. This message is reported as an INFORMATION message and can be useful in tracking problems down.

>>> [DVD] ERROR 4031 (ref. DVD-3 4.1.1 / BP196) :

ERR_DVD_NO_TT_SRPT

The TT_SRPT (Title Search Pointer Table) is mandatory, but missing in this VMGI (the TT_SRPT_SA field was zero).

>>> [DVD] ERROR 4032 (ref. DVD-3 4.1.1 / BP 200) :

ERR_DVD_NO_VMGM_PGCI_UT_SA (BP 200)

When VOBS are associated with the VMGI, indicated by a non-zero value of VMGM_VOBS_SA, the VMGM_PGCI_UT (Video Manager Menu PGCI Unit Table) is mandatory, but missing in this VMGI (the VMGM_PGCI_UT_SA field was zero).

>>> [DVD] ERROR 4035 (ref. DVD-3 4.1.1 / BP 216) :

ERR_DVD_NO_C_ADT_SA

When VOBS are associated with the VMGI, indicated by a non-zero value of VMGM_VOBS_SA, the VMGM_C_ADT (Video Manager Menu Cell Address Table) is mandatory, but missing in this VMGI (the VMGM_C_ADT_SA field was zero).

>>> [DVD] ERROR 4036 (ref. DVD-3 4.1.1 / BP 220) :

ERR_DVD_NO_VMGM_VOBU_ADMAP_SA

When VOBS are associated with the VMGI, indicated by a non-zero value of VMGM_VOBS_SA, the VMGM_VOBU_ADMAP (Video Manager Menu Video Object Unit Address Map Table) is mandatory, but missing in this VMGI (the VMGM_VOBU_ADMAP_SA field was zero).

>>> [DVD] ERROR 4037 (ref. DVD-3 4.1.1 / BP 258) :

ERR_DVD_VMGM_AST_NS_TOO_LARGE

There can be only one Audio stream (VMGM_AST_Ns) associated with the VMGI VOBS. This error reports there was more than one audio stream specified.

>>> [DVD] ERROR 4038 (ref. DVD-3 4.1.1 / BP 258) :

ERR_DVD_VMGM_AST_NS_NOT_NULL

When no VOBS are associated with the VMGI, indicated by a zero value of VMGM_VOBS_SA, the number of Audio streams (VMGM_AST_Ns) should be '0'.

>>> [DVD] ERROR 4039 (ref. DVD-3 4.1.1 / BP 258) :

ERR_DVD_VMGM_SPST_NS_TOO_LARGE

There can be only one Sub-picture stream (VMGM_SPST_Ns) associated with the VMGI VOBS. This error reports there is more than one Sub-picture stream specified.

>>> [DVD] ERROR 4040 (ref. DVD-3 4.1.1 / BP 258) :

ERR_DVD_VMGM_SPST_NS_NOT_NULL

When no VOBS are associated with the VMGI, indicated by a zero value of VMGM_VOBS_SA, the number of Sub-picture streams (VMGM_SPST_Ns) should be '0'.

>>> [DVD] ERROR 4041 (ref. DVD-3 4.1.1) :

ERR_DVD_DATA_FOUND_WITHOUT_VOBS

When no VOBS are associated with the VMGI, indicated by a zero value of VMGM_VOBS_SA, the Video, Audio and Sub-picture stream attributes should specify '0' in every bit. This error indicates some bits from an attribute field were non-zero.

>>> [DVD] ERROR 4042 (ref. DVD-3 4.1.1) :

ERR_DVD_TABLE_FOUND_WITHOUT_VOBS

A table was found (i.e. the start address field contained a non-zero value) in the VMGI, that is only required when VOBS are associated with this VMGI. When no VOBS are associated, these tables should not exist.

This error can specify the following tables:

- VMGM_PGC1_UT

- VMGM_C_ADT

- VMGM_VOB1_ADMAP

>>> [DVD] ERROR 4045 (ref. DVD-3 4.1.1) :

ERR_DVD_EA_SMALL

An end address field specified a value that is too small, usually '0000h'.

>>> [DVD] ERROR 4046 (ref. DVD-3 4.1.1) :

ERR_DVD_EA_EQUAL_SA

In lists where both the start address and the end address of a particular block are given, e.g. in the VMGM_C_ADT (Video Manager Menu Cell Address Table), the end addresses of the (N)th block should not be equal to the start addresses of the (N+1)th block. If this is the case, this error is generated, stating that the end address of the (N)th block should be the Start Address of the (N+1)th block minus '1'.

This error might also indicate that the start address of the (N+1)th block is invalid.

>>> [DVD] ERROR 4047 (ref. DVD-3 4.1.1) :

ERR_DVD_SA_ILLEGAL

A start address field specified the value '0000h', which is not valid, because this value would indicate that a block of data would start at the beginning of the current Logic Block.

>>> [DVD] ERROR 4048 (ref. DVD-3 4.1.1) :

ERR_DVD_SA_ILL_ORDER

In lists where start addresses of blocks are specified, these addresses should be specified in ascending order. When the start address of the (N)th block is smaller than the start address of the (N-1)th block, this error is generated.

This error can specify the following tables:

- VMGM_PGC1_UT

- PTL_MAIT

- VMGM_C_ADT



>>> [DVD] ERROR 4049 (ref. DVD-3 4.1.1) :

ERR_DVD_EA_PAST_SA

In lists where both the start address and the end address of a particular block are given, e.g. in the **VMGM_C_ADT** (Video Manager Menu Cell Address Table), the end addresses of the (N)th block should be smaller than the start addresses of the (N+1)th block, as this would indicate overlapping datablocks.

This error might also indicate that the start address of the (N+1)th block is invalid.

>>> [DVD] ERROR 4050 (ref. DVD-3 4.1.1) :

ERR_DVD_TABLE_POS_ERR

The start address of a table is not equal to the start address specified in the **VMGI_MAT**.

This error can specify the following tables:

- **TT_SRPT**
- **VMGM_PGCI_UT**
- **PTL_MAIT**
- **VTS_ATRT**
- **TXTDT_MG**
- **VMGM_C_ADT**
- **VMGM_VOBU_ADMAP**

>>> [DVD] ERROR 4051 (ref. DVD-3 4.1.1) :

ERR_DVD_SRP_ILL

This error is reported when a **VMGM_PGCI_SRP** does not point to the correct address. The closest address is also reported, to provide some help while solving this error.

>>> [DVD] ERROR 4052 (ref. DVD-3 4.1.1) :

ERR_DVD_SRP_SA_INVALID

This error is reported when a Search pointer does not point to the correct address. The correct address is specified. This error can be reported in:

- **VMGM_LU_SRP** table
- **PLT_MAI_SRP** table
- **VTS_ATR_SRP** table
- **TXTDT_LU_SRP** table
- **IT_TXT_SRP** table

>>> [DVD] ERROR 4055 (ref. DVD-3 4.1.1 / BP 34) :

ERR_DVD_RMA_NOT_DEFINED

At least one Region Management (RMA8....RMA1) field in the **VMG_CAT** should be '0', indicating a region where this disc is allowed to be played. When all the Region Management fields are '1', the disc cannot be played in any region, making this disc useless. As this condition is not specified as an error in the [DVD-3] specification, it will be reported as an oddity by the DVD-Video verifier.

>>> [DVD] ERROR 4056 (ref. DVD-3 4.1.1 / BP 38) :

ERR_DVD_NUM_VOLUMES_ZERO

The **Number_of_Volumes** field in **VMLS_ID** must be at least '1'. This error will be generated if the **Number_of_Volumes** equals '0'.

>>> [DVD] ERROR 4057 (ref. DVD-3 4.1.1 / BP 38) :

ERR_DVD_VOLUME_NUMBER_NULL

The **Volume_number** field in **VMLS_ID** must be at least '1'. This error will be generated if the **Volume_number** equals '0'.

>>> [DVD] ERROR 4058 (ref. DVD-3 4.1.1 / BP 38) :

ERR_DVD_VOLUME_NUMBER_TOO_BIG

The **Volume_number** field in **VMLS_ID** can be maximum the **Number_of_Volumes**, defined in **VMLS_ID**. This error will be generated when the **Volume_number** exceeds the **Number_of_Volumes**.

>>> [DVD] ERROR 4060 (ref. DVD-3 4.1.1 / BP 256) :

ERR_DVD_SOURCE_PICTURE_RESERVED

A value from the range ‘100b’...‘111b’ was specified for the **Source_picture_resolution** field in **VMGM_V_ATR**. These are reserved values and should not be specified, only values from ‘000b’...‘011b’ can be used.

>>> [DVD] ERROR 4061 (ref. DVD-3 4.1.1 / BP 256) :

ERR_DVD_SOURCE_PICTURE_LETTERBOX_ILL

The **Source_picture_letterboxed** field should be set to ‘0’ for the 16:9 **Aspect_ratio**.

>>> [DVD] ERROR 4062 (ref. DVD-3 4.1.1 / BP 256) :

ERR_DVD_DISPLAY_MODE_ILL

This error reports that the specified **Display_mode** is illegal for the specified **Aspect_ratio**. The error occurs when:

- **Display_mode** equals ‘00b’...‘10b’ when the **Aspect_ratio** equals ‘00b’ (4:3).
- **Display_mode** equals ‘11b’ when the **Aspect_ratio** equals ‘11b’ (16:9).

>>> [DVD] ERROR 4064 (ref. DVD-3 4.1.1 / BP 260s) :

ERR_DVD_AUDIO_CODING_MODE_ILL

This error reports that the specified **Audio_coding_mode** is illegal for the specified **TV_system** from the **VMGM_V_ATR**. The error occurs when:

- **Audio_coding_mode** equals ‘010b’ (MPEG-1) or ‘011b’ (MPEG-2), when the **TV_system** equals ‘00b’ (NTSC).
- **Audio_coding_mode** equals ‘000b’ (AC-3) when the **TV_system** equals ‘01b’ (PAL).

>>> [DVD] ERROR 4065 (ref. DVD-3 4.1.1 / BP 260s) :

ERR_DVD_TV_SYSTEM_ILL

This error occurs when the **TV_system** specified in the script is different from the **TV_system** field found in the **VMGM_V_ATR**. The **TV_system** from the script-file is used for verification of the **VMGI**, errors regarding the **TV_system**, **Source_picture_resolution**, **tc_flag** and **audio_coding_mode** can be caused by this.

>>> [DVD] ERROR 4066 (ref. DVD-3 4.1.1 / BP 260) :

ERR_DVD_QUANTIZATION_RESERVED

This error reports that the specified **Quantization/DRC** field is illegal for the specified **Audio_coding_mode**. The error occurs when:

- Quantization/DRC field does not equal ‘11b’, when the **Audio_coding_mode** equals ‘000b’ (Dolby AC-3).
- Quantization/DRC field equals ‘11b’, when the **Audio_coding_mode** equals ‘100b’ (LPCM).



>>> [DVD] ERROR 4067 (ref. DVD-3 4.1.1 / BP 260) :

ERR_DVD_DRC_RESERVED

This error reports that the specified Quantization/DRC field is illegal for the specified **Audio_coding_mode**. The error occurs when:

- Quantization/DRC field equals ‘10b’ or ‘11b’, when the **Audio_coding_mode** equals ‘010b’ (MPEG-1) or ‘011b’ (MPEG-2).

>>> [DVD] ERROR 4068 (ref. DVD-3 4.1.1 / BP 260) :

ERR_DVD_FS_RESERVED

The Frequency (fs) field specified the reserved value ‘10b’ or ‘11b’.

>>> [DVD] ERROR 4069 (ref. DVD-3 4.1.1 / BP 260) :

ERR_DVD_FS_ILL_MPEG

This error reports that the Frequency (fs) field specified an illegal sampling frequency for the specified **Audio_coding_mode**. This error occurs when:

- The **Audio_coding_mode** does not equal ‘100b’ (LPCM) and the Frequency (fs) field specifies the value ‘01b’ (96 kHz).

>>> [DVD] ERROR 4070 (ref. DVD-3 4.1.1 / BP 260) :

ERR_DVD_AUDIO_CHANN_TOO_LARGE

The **Number_of_audio_channels** must not be larger than the defined Number of audio channels for the specified **Audio_coding_mode**. This error occurs when:

- The **Number_of_audio_channels** is larger than ‘001b’ (2ch), when the **Audio_coding_mode** equals ‘100b’ (LPCM).
- The **Number_of_audio_channels** is larger than ‘001b’ (2ch), when the **Audio_coding_mode** equals ‘010b’ (MPEG-1).
- The **Number_of_audio_channels** is larger than ‘101b’ (5ch + 0.1ch), when the **Audio_coding_mode** equals ‘000b’ (AC-3).

>>> [DVD] ERROR 4075 (ref. DVD-3 4.1.1 / BP 342) :

ERR_DVD_SUBPIC_CODING_MODE_RES

The **Sub-picture_coding_mode** field specified a reserved value.

>>> [DVD] ERROR 4080 (ref. DVD-3 4.1.2 / (2)) :

ERR_DVD_TT_SRPT_AGL_TOO_LARGE

The **AGL_Ns** field exceeds ‘9’. A maximum of ‘9’ Angles are allowed.

>>> [DVD] ERROR 4081 (ref. DVD-3 4.1) :

ERR_DVD_NS_NUM_TOO_SMALL

>>> [DVD] ERROR 4082 (ref. DVD-3 4.1.1) :

ERR_DVD_NS_NUM_TOO_LARGE

>>> [DVD] ERROR 4083 (ref. DVD-3 4.1.2-2 / (5)) :

ERR_DVD_TT_VTSN_ILL

>>> [DVD] ERROR 4084 (ref. DVD-3 4.1.2-2 / (5)) :

ERR_DVD_TT_TTN_NON_CONT

This error is reported when the **VTS_TTN** was found not to be continuous. For each **VTSN** in the **TT_SRPT**, the **VTS_TTN** must be assigned continuously, i.e. no gaps are allowed in the assignment of the **VTS_TTN**.

>>> [DVD] ERROR 4085 (ref. DVD-3 4.1.2-2 / (5)) :
ERR_DVD_TT_TTN_NOT_INC

This error is reported when the VTS_TTN was found to have the same value as the VTS_TTN in the previous TT_SRP for the same VTSN. For each VTSN in the TT_SRP, the VTS_TTN must be assigned continuously, i.e. no identical VTS_TTN values are allowed. This check is not implemented because it was found during creation of this document.

>>> [DVD] ERROR 4086 (ref. DVD-3 4.1.2-2 / (3)) :
ERR_DVD_PTT_NS_TOO_LARGE

This error is reported when the PTT_Ns field contains a value that is too large. This could indicate an error in the value of the TT_TY. Valid values for the PTT_Ns are:

- The PTT_Ns value must be in the range ‘1’ to ‘99’ when the TT_TY is ‘0b’ (One_sequential_PGC_title).
- The PTT_Ns value must be in the range ‘1’ to ‘999’ when the TT_TY is ‘1b’ (One_random_PGC_title or Multi_PGC_title).

>>> [DVD] ERROR 4087 (ref. DVD-3 4.1.2-1 / (2)) :
ERR_DVD_TT_SRPT_EA_INVALID

The end address specified in the TT_SRPT_EA field is not correct. The value that is most likely to be the correct value is reported by this error. This could also indicate an error in the TT_SRP_Ns value.

>>> [DVD] ERROR 4090 (ref. DVD-3 4.1) :
ERR_DVD_TXTDT_SRP_SURP

>>> [DVD] ERROR 4091 (ref. DVD-3 4.1.6-3) :
ERR_DVD_TXTDT_SRP_ILL

>>> [DVD] ERROR 4092 (ref. DVD-3 4.1.3-2 / (1)) :
ERR_DVD_VMGM_LCD_REUSE

This error is reported when a language code was used more than once. A language shall only appear once in the table. This error can specify the following tables:

- VMGM_LU_SRP
- TXTDT_LU_SRP

>>> [DVD] ERROR 4093 (ref. DVD-3 4.1.3-2 / (1)) :
ERR_DVD_VMGM_LCD_ILL

This error is reported when a language code value is not valid. Valid language code values are found in the [DVD-3] Annex B. This error can specify the following tables:

- VMGM_LU_SRP
- TXTDT_LU_SRP

>>> [DVD] ERROR 4095 (ref. DVD-3 4.1.3.1-2 / (1)) :
ERR_DVD_NO_ENTRY_MENU

At least one VMGM_PGC_SRP in the VMGM_LU must have the Menu_ID field in VMGM_PGC_CAT set to ‘0010b’ (Title Menu), when the TTM_EXST in VMGM_EXST is set to ‘1b’. This error is reported when this is not the case, indicating that no Entry menu is present for the PGC this PGC_SRP points to, which is not allowed.

>>> [DVD] ERROR 4096 (ref. DVD-3 4.1.3.1-2 / (1)) :
ERR_DVD_MENU_NOT_FOUND



>>> [DVD] ERROR 4097 (ref. DVD-3 4.1.3-2 / (1)) :
 ERR_DVD_MORE_ENTRY_MENU

Only one Title Menu is allowed for each VMGM_LU. This error will be reported when more than one Title Menu was found.

>>> [DVD] ERROR 4098 (ref. DVD-3 4.1.3-2 / (1)) :
 ERR_DVD_MENU_ID_ILL

The Menu_ID value was illegal in combination with the Entry_type (in VMGM_PGC_CAT). This error is reported when:

- The Menu_ID does not equal '0000b' when the Entry_type equals '0b' (Not Entry PGC).
- The Menu_ID does not equal '0010b' when the Entry_type equals '1b' (Entry PGC).

>>> [DVD] ERROR 4099 (ref. DVD-3 4.1.3-2 / (1)) :
 ERR_DVD_BLOCK_MODE_ILL

The Block_mode value was illegal in combination with the Block_type (in VMGM_PGC_CAT). This error will be reported when:

- The Block_mode does not equal '00b' (Not a PGC in the Block) when the Block_type equals '00b' (Not part of a block).

>>> [DVD] ERROR 4100 (ref. DVD-3 3.3.3) :
 ERR_DVD_BLOCK_MODE_ILL2

The Block_mode value was illegal in combination with the Block_type (in VMGM_PGC_CAT). This error will be reported when:

- The Block_mode equals '00b' when the Block_type equals '01b' (Parental block).

>>> [DVD] ODDITY 4105 (ref. DVD-3 4.1.4-1 / BP 1) :
 ERR_DVD_CTY_NS_ILL

The CTY_Ns should be in the range '1'...'255'. This error reports an illegal value.

>>> [DVD] ERROR 4106 (ref. DVD-3 4.1.4-1 / BP 1) :
 ERR_DVD_VTS_NS_ERR

The VTS_Ns specified in the PTL_MAIDI must have the same value as the VTS_Ns specified in the VMGI_MAT.

>>> [DVD] ERROR 4107 (ref. DVD 4.1.3-1 / (2)) :
 ERR_DVD_EA_ERROR

When the complete table is parsed, the current position is compared with the specified end address of the table (e.g. The PTL_MAIDI_EA field). When these values do not match, this error is reported, indicating that the end address field value was wrong.

This error can also indicate a problem with a number field (e.g. The VMGM_PGCI_SRPNs field) or a flag, which causes the wrong number of fields to be parsed.

>>> [DVD] ERROR 4110 (ref. DVD-3 4.1.4-2 / (BP 1)) :
 ERR_DVD_VMGM_CTY_CD_REUSE

A CTY_CD (Country code) was used more than once. A Country code shall only appear once in the PTL_MAI_SRPN table.

>>> [DVD] ERROR 4111 (ref. DVD 4.1.4-2 / (BP 1)) :
 ERR_DVD_VMGM_CTY_CD_ILL

A CTY_CD (Country code) value is not valid. Valid CTY_CD values are found in the ISO-3166 Alpha-2 specification.

>>> [DVD] ERROR 4115 (ref. DVD-3 4.1.4.1 / BP 258) :

ERR_DVD_PTL_ID_VMG_NO_VOBS

When no VOBS are associated with the VMGI, indicated by a zero value of VMGM_VOBS_SA, the PTL_ID_VMG should specify the value '0000h'.

>>> [DVD] ERROR 4116 (ref. DVD-3 4.1.6-2 / (2)) :

ERR_DVD_TXTDT_CHRS_UNICODE

The CHRS (Character set) field in TXTDT_LU_SR_P specifies the value '00h', which is reserved for Unicode.

>>> [DVD] ERROR 4120 (ref. DVD-3 4.1.7-2 / (1)) :

ERR_DVD_VOB_IDN_ORDER

The VMGM_VOB_IDN field from VMGM_CPI should be assigned continuously. This error will be reported when a gap was found in the assignment of the VMGM_VOB_IDN values.

>>> [DVD] ERROR 4121 (ref. DVD-3 4.1.7-2 / (1)) :

ERR_DVD_VOB_IDN_ILL

The VMGM_VOB_IDN value exceeds the number of VOBs in the VMGM_VOBS, specified by the VMGM_VOB_Ns field in VMGM_C_ADTI.

>>> [DVD] ERROR 4122 (ref. DVD-3 4.1.7-2 / (1)) :

ERR_DVD_NEW_VOB_C_IDN_ILL

The first VMGM_C_IDN value from VMGM_CPI for each VMGM_VOB_IDN does not equal '1'.

>>> [DVD] ERROR 4123 (ref. DVD-3 4.1.7-2 / (2)) :

ERR_DVD_C_IDN_ORDER

The VMGM_C_IDN field from VMGM_CPI should be assigned continuously for each VMGM_VOD_IDN. This error will be reported when a gap was found in the assignment of the VMGM_C_IDN values.

>>> [DVD] ERROR 4130 (ref. DVD-3 4.1.8-1 / (1)) :

ERR_DVD_ADMAP_EA_OVER

The VMGM_VOBU_ADMAP_EA value from the VMGM_VOBU_ADMAPI is not correct. This error is reported when the parser cannot read another VMGM_VOBU_AD from the file without reading beyond the VMGM_VOBU_ADMAP_EA. This error is reported as a System Error.

>>> [DVD] ERROR 4131 (ref. DVD-3 4.1.7-1 / (3)) :

ERR_DVD_VMGM_CP_SA_IN_USE

The VMGM_CP_SA field from VMGM_CPI was already specified by another Cell piece.

>>> [DVD] ERROR 4132 (ref. DVD-3 4.1.8-1) :

ERR_DVD_VOBU_NS_ILL

The VMGM_VOB_Ns value from the VMGM_VOBU_ADMAPI does not correspond with the number of VOBU addresses read from the file. This could indicate a problem with the VMGM_VOBU_ADMAP_EA field.

>>> [DVD] ERROR 4133 (ref. DVD-3 4.1.8-1 / (1)) :

ERR_DVD_VOBU_SA_NOT_FOUND

The VMGM_VOBU_SA value could not be found in the VMGM_CP_SA list from the VMGM_C_ADT. Since every Cell starts with a VOBU, the VMGM_VOBU_SA should also be specified in the VMGM_CP_SA list.



4.4.15 DVD VTS checks

>>> [DVD] ERROR 4201 (ref. DVD-3 2.1) :

ERR_DVD_VTS_RESERVED_FIELD_ILL

All reserved fields should have all their bits cleared.

>>> [DVD] ERROR 4202 (ref. DVD-3 4.2) :

ERR_DVD_VTS_RESERVED_VALUE_ILL

All fields should not contain values which are reserved.

>>> [DVD] SYNTAX ERROR 4203 (ref. DVD-3 4.2.1) :

ERR_DVD_VTS_WRONG_OR_NO_VTSI

VTSI Parser Input: Probably a ‘non-VTSI’ stream!!!

>>> [DVD] ERROR 4210 (ref. DVD-3 4.2.1 / BP 0) :

ERR_DVD_VTS_ID_INVALID

The VTS_ID should describe “DVVIDEO-VTS”.

>>> [DVD] INFORMATION 4212 (ref. DVD-3 4.2.1 / BP 192) :

ERR_DVD_VTSM_VOBS_FOUND

Information message!

Reports that Menu-VOBS are found (VTSM_VOBS_SA > 0).

>>> [DVD] ERROR 4214 (ref. DVD-3 4.2.1 / BP 200) :

ERR_DVD_VTS_NO_VTSM_PGCI_UT

When Menu-VOBS exist, VTSM_PGCI_UT should exist as well.

(VTSM_PGCI_UT_SA > 0).

>>> [DVD] INFORMATION 4216 (ref. DVD-3 4.2.1 / BP 212) :

ERR_DVD_VTS_TMAPT_FOUND

Information message!

Reports that a Time Map Table was found in the VTSI (VTS_TMAPT_SA > 0).

>>> [DVD] ERROR 4218 (ref. DVD-3 4.2.1 / BP 216) :

ERR_DVD_VTS_NO_VTSM_C_ADT_SA

When Menu-VOBS exist, VTSM_C_ADT should exist as well.

(VTSM_C_ADT_SA > 0).

>>> [DVD] ERROR 4220 (ref. DVD-3 4.2.1 / BP 220) :

ERR_DVD_VTS_NO_VTSM_VOBU_ADMAP_SA

When Menu-VOBS exist, VTSM_VOBU_ADMAP should exist as well.

(VTSM_VOBU_ADMAP_SA > 0).

>>> [DVD] ERROR 4222 (ref. DVD-3 4.2.1 / BP 32) :

ERR_DVD_VTS_VERN_INVALID

The Version Number should be 1.1.

>>> [DVD] ERROR 4224 (ref. DVD-3 4.2.1) :

ERR_DVD_VTS_DATA_FOUND_WITHOUT_VOBS

When no Menu-VOBS exist, all Menu-related attributes should contain ‘0’.

(VTSM_V_ATR, VTSM_AST_ATR, VTSM_SPST_ATR.)

>>> [DVD] ERROR 4226 (ref. DVD-3 4.2.1 / BP 256 or 512) :

ERR_DVD_VTS_SOURCE_PIC_RES_RESERVED

The Source_picture_resolution field of VTS_V_ATR should only contain a specified value (0-3).

>>> [DVD] ERROR 4228 (ref. DVD-3 4.2.1 / BP 256 or 512) :

ERR_DVD_VTS_SOURCE_PIC_LETTBOX_ILL

Source_picture_letterboxed can only describe “Letterboxed” for Aspect_Ratio ‘0’ (4:3).

>>> [DVD] ERROR 4230 (ref. DVD-3 4.2.1 / BP 258) :

ERR_DVD_VTSM_AST_NS_TOO_LARGE

Only 0 or 1 Menu Audio streams can be specified.

>>> [DVD] ERROR 4232 (ref. DVD-3 4.2.1 / BP 258) :

ERR_DVD_VTSM_AST_NS_NOT_NULL (ref. DVD-3 4.2.1 / BP 258)

When no Menu-VOBS exist, the number of Audio Streams should be '0'.

>>> [DVD] ERROR 4234 (ref. DVD-3 4.2.1 / BP 260) :

ERR_DVD_VTSM_AUDIO_CODING_MODE_ILL

When TV_system describes '0' (ntsc), only '0' (Dolby AC-3) or '1' (Linear PCM) can be specified.

When TV_system describes '1' (pal), only '1' (MPEG-1 or MPEG-2 without extension bitstream),

'2' (MPEG-2 with extension bitstream) or '3' (Linear PCM) can be specified.

>>> [DVD] ERROR 4236 (ref. DVD-3 4.2.1 / BP 516) :

ERR_DVD_VTS_AUDIO_CODING_MODE_ILL

When TV_system describes '0' (ntsc), only '0' (Dolby AC-3) or '1' (Linear PCM) can be specified.

When TV_system describes '1' (pal), only '1' (MPEG-1 or MPEG-2 without extension bitstream),

'2' (MPEG-2 with extension bitstream) or '3' (Linear PCM) can be specified.

>>> [DVD] ERROR 4238 (ref. DVD-3 4.2.1 / BP 260 or 516) :

ERR_DVD_VTS_DRC_RESERVED

The value of Dynamic_Range_Control in VTS(M)_AST_ATR is reserved for the specified
Audio_coding_mode.

>>> [DVD] ERROR 4240 (ref. DVD-3 4.2.1 / BP 260 or 516) :

ERR_DVD_VTS_QUANTIZATION_RESERVED

The value of Quantization in VTS(M)_AST_ATR is reserved for the specified Audio_coding_mode.

>>> [DVD] ERROR 4242 (ref. DVD-3 4.2.1 / BP 260 or 516) :

ERR_DVD_VTS_FS_RESERVED

The value of fs in VTS(M)_AST_ATR can only be '0' (48kHz) or '1' (96 kHz).

>>> [DVD] ERROR 4244 (ref. DVD-3 4.2.1 / BP 260) :

ERR_DVD_VTS_AUDIO_CHANN_TOO_LARGE

The number of Audio Channels in VTSM_AST_ATR exceeds the maximum of 1 (2 channels) for the
specified Audio_coding_mode.

>>> [DVD] ERROR 4246 (ref. DVD-3 4.2.1 / BP 340) :

ERR_DVD_VTSM_SPST_NS_TOO_LARGE

Only 1 Subpicture stream can be specified.

>>> [DVD] ERROR 4248 (ref. DVD-3 4.2.1 / BP 340) :

ERR_DVD_VTSM_SPST_NS_NOT_NULL

When no VTSM_VOBS exist, the number of Subpicture Streams should be '0'.

>>> [DVD] ERROR 4250 (ref. DVD-3 4.2.1 / BP 340) :

ERR_DVD_VTS_SPST_NS_ERR

When VTSM_VOBs exist, the number of Subpicture Streams should be '1'.

>>> [DVD] ERROR 4252 (ref. DVD-3 4.2.1 / BP 342) :

ERR_DVD_VTS_SUBPIC_CODING_MODE_RES

Sub_picture_coding_mode of VTSM_SPST_ATR should only specify '0' or '1'.

>>> [DVD] ERROR 4254 (ref. DVD-3 4.2.1 / BP 512) :

ERR_DVD_VTS_FILM_CAMERA_MODE_ILL

Film_camera_mode can only specify 'film mode' for TV system 625/50 (pal).



>>> [DVD] ERROR 4256 (ref. DVD-3 4.2.1 / BP 514) :
ERR_DVD_VTS_AST_NS_TOO_LARGE
A maximum of 8 Audio streams may be specified.

>>> [DVD] ERROR 4258 (ref. DVD-3 4.2.1 / BP 514) :
ERR_DVD_VTS_AST_NS_NOT_NULL
When no VOBS exist, the number of Audio Streams should be '0'.

>>> [DVD] ERROR 4260 (ref. DVD-3 4.2.1) :
ERR_DVD_VTS_UNUSED_OBJ_CONTAINS_DATA
Unused fields should only contain '0'.
Only used in VTSI_MAT verification.

>>> [DVD] ERROR 4262 (ref. DVD-3 4.2.1 / BP 596) :
ERR_DVD_VTS_SPST_NS_TOO_LARGE
The maximum number of Subpicture streams shoud be 32.

>>> [DVD] ERROR 4266 (ref. DVD-3 4.2.2) :
ERR_DVD_VTS_TOO_MANY_PTT_IN_VTS
A total maximum of 999 PTTs can be in the TTUs.

>>> [DVD] ERROR 4268 (ref. DVD-3 4.2.2-1 / (2)) :
ERR_DVD_VTS_PTT_SRPT_EA_INVALID
The end of the PTT_SRPT is not found at the specified end address.

>>> [DVD] ERROR 4270 (ref. DVD-3 4.2.2-1 / (1)) :
ERR_DVD_VTS_TTU_NS_TOO_SMALL
The number of TTUs should equal the number of titles in this VTS.

>>> [DVD] ERROR 4272 (ref. DVD-3 4.2.2-1 / (1)) :
ERR_DVD_VTS_TTU_NS_TOO_LARGE
The maximum number of TTUs is 99.

>>> [DVD] ERROR 4274 (ref. DVD-3 4.2.6-1) :
ERR_DVD_VTS_NS_TOO_SMALL
The specified number is too small, should be at least 1.

>>> [DVD] ERROR 4275 (ref. DVD-3 4.2.2) :
ERR_DVD_VTS_PGN_ILLEGAL
PGN from TTU should be 1 when PGC is not a One_sequential_PGC_title.

>>> [DVD] ERROR 4280 (ref. DVD-3 4.2.3-1 / (2)) :
ERR_DVD_VTS_PGCIT_EA_INVALID
The specified end address of the VTS_PGCIT is incorrect.

>>> [DVD] ERROR 4282 (ref. DVD-3 4.2.3-1 / (1)) :
ERR_DVD_VTS_PGCI_SRP_Ns_TOO_SMALL
The number of PGCI Search pointers should be at least 1.

>>> [DVD] ERROR 4284 (ref. DVD-3 4.2.3-2 / (1)) :
ERR_DVD_VTS_PGC_CAT_VTS_TTN_TOO_SMALL
The title number is too small, should be at least 1.

>>> [DVD] ERROR 4286 (ref. DVD-3 4.2.3-2 / (1)) :
ERR_DVD_VTS_PGC_CAT_VTS_TTN_TOO_LARGE
The title number is too large, should be at most 99.

>>> [DVD] ERROR 4288 (ref. DVD-3 4.2.3-2 / (1)) :
ERR_DVD_VTSM_LCD_ILL
A language code should be between 'AA' and 'ZZ'.

>>> [DVD] ERROR 4290 (ref. DVD-3 4.2.3-2 / (1)) :
ERR_DVD_VTSM_LCD_REUSE
A language code in **VTSM_LCD** is used more than once in this table.

>>> [DVD] ERROR 4292 (ref. DVD-3 4.2.6-2 or 4.2.8-2 / (3)) :
ERR_DVD_VTSM_CP_SA_IN_USE
The specified Start address was already used.

>>> [DVD] ERROR 4294 (ref. DVD-3 4.2.1)
ERR_DVD_VTS_TABLE_POS_ERR
This table was found at a different starting address than specified in the **VTSI_MAT**.

>>> [DVD] ERROR 4296 (ref. DVD-3 4.2.1)
ERR_DVD_VTS_RESERVED_BLOCK_ILL
A block of reserved bytes should only contain '0'.
Only used for reserved fields in **VTSI_MAT**.

>>> [DVD] ERROR 4298 (ref. DVD-3 4.2)
ERR_DVD_VTS_EA_SMALL
The specified end address of the table is too small.

>>> [DVD] ERROR 4300 (ref. DVD-3 4.2)
ERR_DVD_VTS_EA_ERROR
The specified end address is not in accordance with the parsed length of the table.

>>> [DVD] ERROR 4302 (ref. DVD-3 4.2)
ERR_DVD_VTS_SA_ILLEGAL
The specified start address points to an illegal address.

>>> [DVD] ERROR 4304 (ref. DVD-3 4.2)
ERR_DVD_VTS_SA_ILL_ORDER
The specified start address is smaller than the previous start address.
In a table of start addresses, all addresses should be listed in ascending order.

>>> [DVD] ERROR 4306 (ref. DVD-3 4.2)
ERR_DVD_VTS_SRP_SA_INVALID
The specified start address does not correspond with the found start address.

>>> [DVD] ERROR 4308 (ref. DVD-3 4.2.4.1-2 / (1)) :
ERR_DVD_VTS_NO_ENTRY_MENU
No Entry Menu PGC was found in this table.

>>> [DVD] ERROR 4310 (ref. DVD-3 4.2.4.1-2 / (1)) :
ERR_DVD_VTS_MENU_NOT_FOUND
The **VTSM_EXT** specified an entry PGC exists for the menu_id, but this menu_id was not found.

>>> [DVD] ERROR 4312 (ref. DVD-3 4.2) :
ERR_DVD_VTS_SRP_ILL
The current start address is not found in the Search Pointer Table.

>>> [DVD] ERROR 4314 (ref. DVD-3 4.2.4.1-2 / (1)) :
ERR_DVD_VTS_MORE_ENTRY_MENU
More than one Entry Menu PGC was found in this table.

>>> [DVD] ERROR 4316 (ref. DVD-3 4.2.4.1-2 / (1)) :
ERR_DVD_VTS_MENU_ID_ILL
The specified Menu_ID is reserved for the corresponding Entry_type.

>>> [DVD] ERROR 4318 (ref. DVD-3 4.2.4.1-2 / (1)) :
ERR_DVD_VTS_BLOCK_MODE_ILL
For the corresponding Block_type, Block_mode should be the specified value.



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>>> [DVD] ERROR 4320 (ref. DVD-3 4.2.4.1-2 / (1)) :

ERR_DVD_VTS_BLOCK_MODE_ILL

The specified Block_mode should not be used with the corresponding Block_type.

>>> [DVD] ERROR 4322 (ref. DVD-3 4.2.6-2 or 4.2.8-2 / (1)) :

ERR_DVD_VTS_VOB_IDN_ILL

VTS(M)_VOB_IDN is larger than the specified number of VOBs.

>>> [DVD] ERROR 4324 (ref. DVD-3 4.2.6-2 or 4.2.6-2 / (1)) :

ERR_DVD_VTS_VOB_IDN_ORDER

VTS(M)_VOB_IDN should be assigned continuously.

>>> [DVD] ERROR 4326 (ref. DVD-3 4.2.6-2 or 4.2.8-2 / (2)) :

ERR_DVD_VTS_C_IDN_ORDER

All Cell ID numbers should be assigned continuously.

>>> [DVD] ERROR 4328 (ref. DVD-3 4.2) :

ERR_DVD_VTS_EA_PAST_SA

The specified End Address points beyond the next Start Address.

>>> [DVD] ERROR 4330 (ref. DVD-3 4.2) :

ERR_DVD_VTS_EA_EQUAL_SA

The specified End Address cannot equal the next Start Address.

>>> [DVD] ERROR 4332 (ref. DVD-3 4.2.8-1) :

ERR_DVD_VTS_VOBU_NS_ILL

The specified number of VTSM_VOBs should be equal to, or larger than the number of VOBUs found in the VTSM_VOBU_ADMAP.

>>> [DVD] ERROR 4334 (ref. DVD-34.2.6-2 or 4.2.8-2 / (1)) :

ERR_DVD_VTS_VOB_IDN_DECREASE

VTS(M)_VOB_IDN cannot be assigned in decreasing order.

>>> [DVD] ERROR 4336 (ref. DVD-3 4.2.8-2) :

ERR_DVD_VTS_C_IDN_ILL

The specified Cell id should be equal to, or 1 higher than the previous Cell id.

Any other specified value is illegal.

>>> [DVD] ERROR 4338 (ref. DVD-34.2.8-2) :

ERR_DVD_VTS_CP_SA_LOWER_ILL

The specified start address cannot be lower than the previous start address within a VOB.

>>> [DVD] ERROR 4340 (ref. DVD-3 4.2.8-2) :

ERR_DVD_VTS_CP_SA_EQUAL_ILL

The specified end address can only be equal to the previous end address, when a Cell boundary exists within a CellPiece.

>>> [DVD] ERROR 4342 (ref. DVD-3 4.2.8-2) :

ERR_DVD_VTS_CP_EA_ILL

The specified end address shall be equal to the previous end address, when a Cell boundary is detected in a CellPiece.

>>> [DVD] ERROR 4344 (ref. DVD-3 4.2.8-2) :

ERR_DVD_VTS_CP_EA_LOWER_SA

The specified end address should be larger than the start address.

>>> [DVD] ERROR 4346 (ref. DVD-3 4.2.7-1 or 4.2.9-1 / (1)) :

ERR_DVD_VTS_ADMAP_EA_OVER

The VOBU_ADMAP table exceeds the specified End Address.

>>> [DVD] ERROR 4348 (ref. DVD-3 4.2.7-1 / (1)) :
 ERR_DVD_VTS_VOBU_SA_NOT_FOUND
 The specified CellPiece Start Address was not found in the VOBU_ADMAP table.

>>> [DVD] ERROR 4350 (ref. DVD-3 4.2.7-1 / (1)) :
 ERR_DVD_VTS_NEW_VOB_C_IDN_ILL
 The first Cell ID number of a VOB should be '1'.

>>> [DVD] ERROR 4352 (ref. DVD-3 4.2.5) :
 ERR_DVD_VTS_TMAP_TMU_INVALID
 TMU should contain '0' if no MAP_EN exists.

>>> [DVD] ERROR 4354 (ref. DVD-3 4.2.5) :
 ERR_DVD_VTS_TMAP_MAP_EN_Ns_INVALID
 The number of Map Entries should be '0' when Time Unit is '0'.

>>> [DVD] ERROR 4356 (ref. DVD-3 4.2.5) :
 ERR_DVD_VTS_TMAP_MAP_EN_Ns_TOO_LARGE (ref. DVD-3 4.2.5)
 The number of Map Entries should be between 0 and 2048.

>>> [DVD] ERROR 4358 (ref. DVD-3 4.2) :
 ERR_DVD_VTS_RESERVED_VALUE_ILL_STR (ref. DVD-3 4.2)
 A field has a reserved value.
 (This error is the same as ERR_DVD_VTS_RESERVED_VALUE_ILL, but the matching string of the reserved field is printed as well).

4.4.16 DVD PGCI checks

>>> [DVD] INFORMATION 4402 (ref. DVD-3 4.3.2) :
 ERR_DVD_PGCI_DETECTED
 This states that a PGC_CMDT, PGC_PGMAP, C_PBIT or C_POSIT was detected in the PGC_GI.

>>> [DVD] ERROR 4404 (ref. DVD-3 4.3.2) :
 ERR_DVD_PGCI_MANDATORY
 A C_POSIT table is mandatory when a C_PBIT table exists.

>>> [DVD] INFORMATION 4406 (ref. DVD-3 4.3.2 (1)) :
 ERR_DVD_PGCI_ILL_PRESENT
 The presence of a C_POSIT is not allowed for the FP_PGCI.

>>> [DVD] ERROR 4408 (ref. DVD-3 4.3.2 (1)) :
 ERR_DVD_PGCI_PGC_WO_VOB_DETECTED
 The PGC in this PGC_CNT does not contain any VOB start addresses.

>>> [DVD] ERROR 4410 (ref. DVD-3 4.3.2 (1)) :
 ERR_DVD_PGCI_NO_VOB
 When no VOB is used in this PGC_CNT, the Number of Programs and Number of Cells should be '0'.



>>> [DVD] ERROR 4412 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_NOVOB_VALUE_EQ

If no VOB is used, the following fields should be '0':

Number of Programs

Number of Cells

Hours (tens)

Hours (units)

Minutes (tens)

Minutes (units)

Second (tens)

Second (units)

Video frame (tens)

Video frame (units)

>>> [DVD] ERROR 4414 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_RANGE

This message is used to state any errors in the valid range of:

Number of Programs 0 .. 99

Number of Cells 0 .. 255

Hours (tens) 0 .. 9

Hours (units) 0 .. 9

Minutes (tens) 0 .. 5

Minutes (units) 0 .. 9

Second (tens) 0 .. 5

Second (units) 0 .. 9

Video frame (tens) 0 .. 2

Video frame (units) 0 .. 9

>>> [DVD] ERROR 4416 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_RESERVED

This field is using a reserved value, which is not allowed.

>>> [DVD] ERROR 4418 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_MAX_NUM

The maximum number of PRE_CMD_Ns is 128.

The maximum number of POST_CMD_Ns is 128.

The maximum number of C_CMD_Ns is 128.

>>> [DVD] ERROR 4420 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_MAX_SUM

The sum of PRE_CMD_Ns + POST_CMD_Ns + C_CMD_Ns should be at most 128.

>>> [DVD] ERROR 4422 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_TOO_LARGE

The specified PGC_CMDT_EA is beyond the actual PGC_CMD table size.

>>> [DVD] ERROR 4424 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_TOO_SMALL

The specified PGC_CMDT_EA is smaller than the actual PGC_CMD table size.

>>> [DVD] ERROR 4426 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_ALWAYS_VALUE

The first EN_CN of the PGC_PGMAP should always be '1'.

>>> [DVD] ERROR 4428 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_DEPEND_VALUE

If C_PBIT_SA is '0', Luminance_signal_Y, Color_difference_Cr and Color_difference_Cb should be '0' as well.

>>> [DVD] ERROR 4430 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_CELL_BLOCK_EQ (ref. DVD-3 4.3.2)

If Cell_Block_type is '1' (Angle block), Cell_Block_mode should not be '0' (Not a cell in the block).

>>> [DVD] ERROR 4432 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_CELL_BLOCK_NEQ (ref. DVD-3 4.3.2)

If Cell_Block_type is '0', Cell_Block_mode should not be '0'.

>>> [DVD] ERROR 4434 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_RES_FIELD_NOT_ZERO

All Reserved fields should contain only '0'.

>>> [DVD] ERROR 4436 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_CELL_TYPE_ERR

The Cell_type should contain '0' when Application type is NOT Karaoke.

>>> [DVD] ERROR 4438 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_DEC_STR_ERR

Decoding Audio or Sub_picture stream numbers should be '0' when Availability flag is '0'.

>>> [DVD] ERROR 4440 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_COMMAND_NR_TOO_LARGE

The Cell_Command_Number is larger than number of Cell Commands.

>>> [DVD] ERROR 4442 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_CELL_PB_MODE_ERR

The Cell_playback_mode should be set to '0' when Cell_Still_time is not set to '0'.

>>> [DVD] ERROR 4444 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_LAST_CELL_ERR

When Still time value is NOT set to '0' the last Cell in all PGs should be set to '0'.

>>> [DVD] ERROR 4446 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_DOMAIN_ERR

This error message is used to state that:

- The Next_PGC_number should be '0' when found in a PGC in the System space.
- The Previous_PGC_number should be '0' when found in a PGC in the System space.
- The GoUp_PGCN should be '0' when found in a PGC in the FP_DOM space.
- The PG_Playback_mode should be '0' when found in a PGC in the Menu space.

>>> [DVD] ERROR 4447 (ref. DVD-3 4.3.2) :

ERR_DVD_PGCI_DATA_NO_VOB

The Availability flag for 'audio or sub-picture' should be '0' when found in a PGC in without any Cells or Programs.



4.4.17 DVD PCI checks

Assumptions

- [A1] The video field grid starts on the first PTS (or DTS) of the video data. Since the first VOBU has to contain the first video, this is the first PTS of the first VOBU.
- [A2] HLI information is only allowed in a menu VOBS (in Menu Space).
- [A3] A VOBU's video presentation start time is given by the presentation start time of its first picture in DISPLAY ORDER ! Notice that in coding order this first picture (which is always an I-picture) may be preceded by some B-pictures.
- [A4] Angle changes are confined to the current VOB.

>>> [DVD] INFORMATION 4501 (ref. N/A) :

ERR_DVD_PCI_NO_XCHECK_PARAS

Necessary cross check parameters not found on the cross check data file ! Certain PCI checks will use default values for missing cross check parameters:

cross check parameter	default value
Cell_still_time	0
Cell_Block_type	0
Seamless_Angle_Change_flag	1
Number of Angles	1

4.4.17.1 PCI_GI Checks

>>> [DVD] ERROR 4511 (ref. DVD-3 4.4.1 (1)) :

ERR_DVD_PCI_GI_NV_PCK_LBN

The NV_PCK_LBN value is not equal to the RLBN of the NV_PCK this PCI is included in.

>>> [DVD] ERROR 4512 (ref. DVD-3 4.4.1 (2)) :

ERR_DVD_PCI_VOBU_CAT

The APSTB value should be 0 when the CGMS in the file descriptor of the file containing this VOBU, is not 0x11.

This is a Cross Check between the File System & VOB data !

Not implemented yet : CGMS of file descriptor not available yet.

>>> [DVD] ERROR 4513 (ref. DVD-3 4.4.1 (3) / Table J.2-1) :

ERR_DVD_PCI_VOBU_UOP_CTL

The indicated VOBU_UOP_CTL_UOP bit is 1, should be 0 (reserved).

>>> [DVD] ERROR 4521 (ref. DVD-3 4.4.1 (4)) :

ERR_DVD_PCI_VOBU_S_PTM

The VOBU contains video and the VOBU_S_PTM value is different from the VOBU's video presentation start time.

Taking into account [A3], the latter is given by :

- PTS of the first picture when it has a temporal reference zero, since this indicates it is the 1st picture in display order.
- DTS of the first picture to which 1 frame period is added.

>>> [DVD] ERROR 4522 (ref. DVD-3 4.4.1 (4)) :
 ERR_DVD_PCI_VOBUS_PTMMULT

The VOBU does not contain video data and the VOBUS_PTMMULT value is not aligned with the video field grid. (Assuming [A1]).

>>> [DVD] ERROR 4523 (ref. DVD-3 ???) :
 ERR_DVD_PCI_VOBUS_PTMLLL

Illegal VOBUS_PTMMULT value : smaller than the previous VOBU's NV_PCK SCR.

- It is not yet clear how the VOBU's start & termination times are constrained by the pack's SCR values.

>>> [DVD] ERROR 4524 (ref. DVD-3 4.4.1 (5)) :
 ERR_DVD_PCI_VOBUE_PTMM

The VOBUE_PTMM value is different from the VOBU 's video presentation termination time.

>>> [DVD] ERROR 4525 (ref. DVD-3 4.4.1 (6)) :
 ERR_DVD_PCI_VOBUE_PTMMULT

The VOBU does not contain video data or is terminated (with a sequence_end_code) and the VOBUE_PTMM value is not aligned with the video field grid. (Assuming [A1]).

>>> [DVD] ERROR 4526 (ref. DVD-3 ???) :
 ERR_DVD_PCI_VOBUE_PTMLL

Illegal VOBUE_PTMLL value : larger than the next VOBU 's NV_PCK.

>>> [DVD] ERROR 4527 (ref. DVD-3 4.4.1 (6)) :
 ERR_DVD_PCI_VOBUSE_PTMM

The VOBUSE_PTMM value is different from the VOBU's video presentation termination time.

>>> [DVD] ERROR 4528 (ref. DVD-3 4.4.1 (6)) :
 ERR_DVD_PCI_VOBUSE_PTMM0

The VOBUSE_PTMM0 value is not zero while the VOBU does not contain a sequence_end_code.

>>> [DVD] ODDITY 4529 (ref. DVD-3 4.4.1 (4,5)) :
 ERR_DVD_PCI_VOBUPTMDUR

PCI_GI : The VOBUS_PTMM value 'value' and VOBUE_PTMM value 'value' specify a VOBU presentation time 'value' which is no integer multiple of the video frame period 'value'.

>>> [DVD] ERROR 4531 (ref. DVD-3 4.4.1 (7)) :
 ERR_DVD_PCI_GIC_ELTMLLL

One of the C_ELTMLL BCD field contains an illegal value, i.e. not within the specified (hour, minute, second) boundaries.

>>> [DVD] ERROR 4532 (ref. DVD-3 4.4.1 (7)) :
 ERR_DVD_PCI_GIC_ELTMRSRVD

C_ELTMRSRVD contains a reserved tc_flag value 0x00 or 0x10.

>>> [DVD] ERROR 4533 (ref. DVD-3 4.4.1 (7)) :
 ERR_DVD_PCI_GIC_ELTMTVSY

C_ELTMTVSY contains a tc_flag value which is inconsistent with the stream's TV system (PAL or NTSC).

>>> [DVD] ERROR 4534 (ref. DVD-3 4.4.1 (7)) :
 ERR_DVD_PCI_GIC_ELTM1ST

C_ELTM1ST value is not zero for the first PCI of a Cell.



>>> [DVD] ERROR 4535 (ref. DVD-3 4.4.1 (7)) :

ERR_DVD_PCI_GI_C_ELTM

C_ELTM value has a different value than expected. The expected value is the duration of the number of (real or imagined) video frames between the start of the Cell and the current VOBU.

>>> [DVD] ERROR 4538 (ref. DVD-3 4.4.1 (7)) :

ERR_DVD_PCI_GI_C_ELTM_XCHK

The C_ELTM tc_flag value is different from that specified by occurrences in the navigation data, i.c. PGCI data :

- PGC_PB_TM (cf. [DVD-3] 4.3.2 (2))
- C_PBTM (cf. [DVD-3] 4.3.5 (2))

This is a Cross Check between the disk's Navigation & VOB data !

Not implemented yet.

4.4.17.2 NSML_AGLI Checks

Observations :

1. An Angle Block (AGL_C_BLK) consists of max. 9 Angles, each composed of exactly 1 Angle Cell (AGL_C).
2. One AGL_C consists of an integer number of "parts of AGL_C", of which the start address is described by the PCI NSML_AGLI data.
3. The NSML_AGLI data describes a sequential 'slice' of a complete Angle Block, always containing a part (of identical duration) of each of the 9 possible Angle Cells.
4. Each (part of) AGL_C consists of an integer number of VOBUs, possibly more than 1.
5. Angle Cells of a non-Seamless Angle Block are multiplexed as complete & consecutive data : i.e. all VOBUs part of the same Angle Cell follow each other; after the last VOBU of an Angle Cell, the first VOBU of the next Angle Cell starts.
6. Each Angle Cell is in fact another VOB within a non-Seamless Angle Block.

Used Cross Check Parameters :

A dedicated flag "Seamless_Angle_Change_flag" & parameter "Cell_Block_type" have been defined & used for these checks. These match a field with the same name of the PGCI - C_PBI - C_CAT data structure (cf. [DVD-3] Table 4.3.5-1 (1)) and is made available through the Xcheck data file. Also the number of Angles defined in the current Title (defined by the VMGI - TT_SRPT - TT_SRP(i) - AGL_Ns field, cf.[DVD-3] Table 4.1.2-2) is passed through the Xcheck data file.

As a consequence, the checks using any of these parameters can only be properly performed when the proper Cross Checks data (file) is present. If this file is missing, rather than disabling these checks, the necessary parameters otherwise retrieved from this file, are given their default value (which in most cases comes down to a de facto disabling of the checks) :

Seamless_Angle_Change_flag	1
Cell_Block_type	0
AGL_Ns	1

PCI NSML_AGLI Verification Lists :

The verification of the NSML_AGLI table entries is done separately for forward & backward references :

- Backward references (i.e. references to VOBUs containing or before the current PCI & marked by AGL_C location == 1) are checked immediately using a "VOBU" list with all the VOBUs encountered in the current VOB so far. Each entry contains all necessary information for the checks (absolute pack (LB) address, start time, etc.).
- Forward references (i.e. references to VOBUs after the current PCI's stream position & marked by AGL_C location == 0) are checked whenever the target VOBU, i.e. the VOBU referenced by a PCI in the preceding part of the AGL_C_BLK, is encountered in the stream. Therefore a "ref" list is used to store all forward NSML_AGLI references still to be checked.

Since all these references are restricted to the current Angle Block, this "ref" list is generated during the current AGL_C_BLK parsing, valid for the current block only and destroyed at the end of the AGL_C_BLK.

>>> [DVD] ERROR 4541 (ref. DVD-3 4.4.2) :

ERR_DVD_PCI_NSML_AGLI_NOT0 (ref. DVD-3 4.4.2)

Not all 9 NSML_AGLI_C[#n]_DSTA entries are zero, although no Angle Block exists or the Angle Block is seamless.

>>> [DVD] ERROR 4542 (ref. DVD-3 4.4.2) :

ERR_DVD_PCI_NSML_AGLI_NR

The n-th NSML_AGLI_C[#n]_DSTA entry contains a non-zero value, although there are fewer than n angles defined (by the VMGI - TT_SRPT - TT_SRP(i) - AGL_Ns field, cf. [DVD-3] Table 4.1.2-2).

>>> [DVD] ERROR 4543 (ref. DVD-3 4.4.2) :

ERR_DVD_PCI_NSML_AGLI_0

The n-th NSML_AGLI_C[#n]_DSTA entry contains a zero value, although a Non-Seamless Angle Change has been indicated defined (by the VMGI - TT_SRPT - TT_SRP(i) - AGL_Ns field, cf. [DVD-3] Table 4.1.2-2).

>>> [DVD] ERROR 4544 (ref. DVD-3 4.4.2) :

ERR_DVD_PCI_NSML_AGLI_LOC

The n-th NSML_AGLI_C[#n]_DSTA entry AGL_C location field indicates a VOBU location after/before the current NV_PCK, while it is before/after.

>>> [DVD] ERROR 4545 (ref. DVD-3 4.4.2) :

ERR_DVD_PCI_NSML_AGLI_STRT

The n-th NSML_AGLI_C[#n]_DSTA entry AGL_C field specifies an incorrect (non-existing) VOBU start address.

>>> [DVD] ERROR 4546 (ref. DVD-3 4.4.2) :

ERR_DVD_PCI_NSML_AGLI_PST

The presentation start time of the VOBU described by the n-th NSML_AGLI_C[#n]_DSTA ACL_C, should be equal or immediately before/after the presentation start time of the current VOBU (containing this PCI).



>>> [DVD] ERROR 4547 (ref. DVD-3 4.4.2) :

ERR_DVD_PCI_NSML_AGLI_NO_PST

The PCI of the current VOBU of an Angle Cell, with start PTM \leq 1.2 seconds less than the Cell end PTM, does not have its AGL_C destination address field set to 0x7FFFFFFF to prevent angle changes at the end of an Angle Block.

This is no ERROR, but implemented as an RECOMMENDATION VIOLATION.

- This check is triggered by an EVT_VOB_END event. Taking into account observation-6, this marks the end of an AGL_C. All (still unverified) references still stored in the reference list are then considered to belong to the last AGL_C part and to refer to no other AGL_C part. These should then have their AGL_C destination address field set to 0x7FFFFFFF.

>>> [DVD] ERROR 4548 (ref. DVD-3 4.4.2) :

ERR_DVD_PCI_NSML_AGLI_AGL_C_NOT1

The n-th NSML_AGLI_C[#n]_DSTA entry AGL_C destination address field is not 0x7FFFFFFF for the current PCI following a VOBU with start PTM \leq 1.2 seconds less than the Cell end PTM which has its AGL_C destination address field set to 0x7FFFFFFF.

This check together with the previous one originate from the v1.0 spec update and are interpreted as follows : all VOBUs (PCIs) of the **last** Angle Cell piece of **each** Angle Cell of a non-Seamless Angle Block, should have their AGL_C destination address field set to 0x7FFFFFFF or **none**.

4.4.17.3 HL_GI Checks

Observations :

1. The presentation start time of a SPU is the PTS of the packet containing its first byte.

Assuming [A2] : VMGI_MAT - VMGM_SPST_Ns & VTSI_MAT - VTSM_SPST_Ns allow max. 1 SP stream. So the HLI info matches the only SP present and there is no need to specify which SP this HLI data is aimed at. However :

One SP stream may contain several sub-picture units (SPUs), when e.g. for proper multiplexing SP data is transmitted well before it is needed. In this case, the HLI is aimed at the SPU for which the presentation time is within the VOBU 's presentation time. So the SPU matches the VOBU (and its matching HLI) for which :

$$VOBU_S_PTM \leq SPU_PTS \leq VOBU_E_PTM$$

2. When a SPU has a STP_DSP command, this has to be its last SP_DCSQ command (cf. [DVD-3] Annex L, Table L-1 5.d). As a consequence, the "start time of the DCSQ (SP_DCSQ_STM)" equals the SPU presentation termination time SPU_PTT.

Where $SPU_PTT = SPU_PST + SP_DCSQ_STM * 1024$.

3. cf. [DVD-3] Table 5.1-1 : A Sub-picture presentation is valid only in the Cell where the SPU is recorded. This means a sub-picture can not pass Cell boundaries and VOBU - SPU matches are confined to the same Cell.

Cross Check Parameters :

Again a dedicated parameter "Cell_Still_time" has been defined & used for these checks. It matches a field with the same name of the PGCI - C_PBI - C_CAT data structure (cf. [DVD-3] Table 4.3.5-1 (1)) and is made available through the Xcheck data file.

As a consequence, the checks using these parameters can only be properly done when the proper Cross Checks data (file) is present. If this file is missing, rather than disabling these checks, the necessary parameter otherwise retrieved from this file, is given its default value (which in most cases comes down to a de facto disabling of the checks) :

Cell_Still_time	0
-----------------	---

Verification Lists :

Two lists are used for verification of PCI HL_GI data and matching SPUs :

1. The "SPUL" list stores relevant data of SPUs, multiplexed in the stream well before they are needed, thus ahead of the VOBU PCI containing the matching HLI data.
2. The "PCIL" list, storing the relevant VOBU and PCI HLI data for PCIs with HLI data still unmatched by the underlying SPU.

Both lists are used at the appropriate moments (events) to verify the correct match of HLI and SPU data.

>>> [DVD] ERROR 4550 (ref. DVD-3 4.4.3.2 (1)) :

ERR_DVD_PCI_HLI_1ST

HLI_SS is not 0x0 or 0x1 as is required for the first VOBU of a Cell and a fortiori for the first VOBU of a VOB.

>>> [DVD] ERROR 4551 (ref. DVD-3 4.4.3.2 (1)) :

ERR_DVD_PCI_HLI_SS_COPY

HLI_SS (01b) indicates that the HLI data should be different from that of the previous VOBU within the current Cell / VOB, but it is identical !

- This includes the following HLI data :

- the HL_GI data
- the BTN_COLIT data
- the BTNIT data

>>> [DVD] ERROR 4552 (ref. DVD-3 4.4.3.2 (1)) :

ERR_DVD_PCI_HLI_SS_DIFF

HLI_SS (10b or 11b) indicates that the HLI data should be identical to that of the previous VOBU, which is not the case.

- This includes the following HLI data :

- the HL_GI data (except for the HLI_SS value)
- the BTN_COLIT data
- the BTNIT data, except for the BTN_CMD data when HLI_SS is 11b

>>> [DVD] ERROR 4553 (ref. DVD-3 4.4.3.2 (1) & 3.3.10.1 2nd Note) :

ERR_DVD_PCI_HLI_DIFF_SML

In a Seamless Angle Block completely identical HLI data has to be recorded.

! Not implemented yet.



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>>> [DVD] ERROR 4556 (ref. DVD-3 4.4.3.2 (2) & 3.3.10.1) :

ERR_DVD_PCI_HLI_S_PT

The HLI_S_PT value is not equal to the presentation start time of the SPU it is aimed at (SPU_PST).

- As a consequence of Observation-1 above, at most the first SPU can be verified immediately against the PCI HLI data of the VOBU it is contained in (i.e. upon an EVT_SPU_START event). Other SPU data is to be stored and verified when its matching HLI data becomes available (upon a new EVT_PCI event).

Where the presentation start time of a SPU is the PTS of the packet containing its first byte.

>>> [DVD] ERROR 4557 (ref. DVD-3 4.4.3.2 (3) & 3.3.10.1) :

ERR_DVD_PCI_HLI_E_PT

The HLI_E_PT value is not equal to the presentation termination time of the SPU it is aimed at.

This error message can be generated in three distinct situations (cf. [DVD-3] 3.3.10.1) :

- If the SPU is not the last of a Cell and it has no STP_DSP command, when the HLI_E_PT value is different from the PTS of the next SPU.
 - If the SPU has a STP_DSP command, when the HLI_E_PT value is different from the SPU's presentation termination time.
 - If the corresponding SPU is the last in the Cell and it has no STP_DSP command, when the HLI_E_PT value is different from the end time of the Cell's last VOBU (PCI_GI - VOBU_E_PT).
- This is verified using the above described verification lists, to match PCI HLI data and SPU data. Again this has to be verified on distinct moments :
 - for current or future SPUs, using the PCIL list
 - on EVT_SPU_START (situation 1)
 - on EVT_SPU (situation 2)
 - for "send-ahead" SPUs, using the SPUL list
 - on EVT_PCI (situation 1 or 2)
 - on EVT_CELL_END (for situation 3)

>>> [DVD] ERROR 4558 (ref. DVD-3 4.4.3.2 (4) & 3.3.10.1) :

ERR_DVD_PCI_HLI_SL_E_PT

This error message is generated in two distinct situations :

- The HLI_SL_E_PT value is not larger than the SPU highlight start time (HLI_S_PT).
- The HLI_SL_E_PT value is not smaller than or equal to the SPU highlight termination time (HLI_E_PT).

>>> [DVD] ERROR 4559 (ref. DVD-3 4.4.4.2 (3,4) & 3.3.10.1) :

ERR_DVD_PCI_HLI_E_PT_STILL

The HLI_E_PT or BTN_SL_E_PT value is not 0xFFFFFFFF during a Cell Still, or HLI_E_PT equals 0xFFFFFFFF and BTN_SL_E_PT does not.

>>> [DVD] ERROR 4560 (ref. DVD-3 4.4.3.1) :

ERR_DVD_PCI_HLI_BTNGR_CONT_DIF

Corresponding buttons in distinct button groups, i.e. buttons sharing the same button number, differ more than for their display position or size.

>>> [DVD] ERROR 4561 (ref. DVD-3 4.4.3.2 (5)) :

ERR_DVD_PCI_HLI_BTNGR_NS_0

The number of button groups BTNGR_Ns should be larger than 0, for valid HLI data.

>>> [DVD] ERROR 4562 (ref. DVD-3 4.4.3.2 (5)) :

ERR_DVD_PCI_HLI_BTNGR_NS_43

When the (VTS_V_ATR) Video attribute aspect ratio is 4:3, there can be only 1 button group :
BTNGR_Ns should be 01b.

>>> [DVD] ERROR 4563 (ref. DVD-3 4.4.3.2 (5)) :

ERR_DVD_PCI_HLI_BTNGR1_DSP_43 (ref. DVD-3 4.4.3.2 (5))

When the (VTS_V_ATR) Video attribute aspect ratio is 4:3, the only button group present should have a zero display type of the Decoding SP stream (meaning only Normal 4:3 presentation).

>>> [DVD] ERROR 4564 (ref. DVD-3 4.4.3.2 (5)) :

ERR_DVD_PCI_HLI_BTNGR1_DSP_16_9 (ref. DVD-3 4.4.3.2 (5))

When the (VTS_V_ATR) Video attribute aspect ratio is 16:9, only Normal 4:3 presentation display type of the Decoding SP stream is not allowed, even for group 1.

>>> [DVD] ERROR 4565 (ref. DVD-3 4.4.3.2 (5)) :

ERR_DVD_PCI_HLI_BTNGR23_DSP (ref. DVD-3 4.4.3.2 (5))

The button group display type for non-existing button groups should be 0 :

BTNGR[#n]_DSP_TY should be 0x0 when BTNGR_Ns < i.

>>> [DVD] ERROR 4566 (ref. DVD-3 4.4.3.2 (5)) :

ERR_DVD_PCI_HLI_BTNGR23_DSP0 (ref. DVD-3 4.4.3.2 (5))

The button group display type for button groups 2 or 3 should not be 0 when these groups have been defined :

BTNGR2_DSP_TY should be > 0 when BTNGR_Ns >= 2, and

BTNGR3_DSP_TY should be > 0 when BTNGR_Ns = 3.

>>> [DVD] ERROR 4567 (ref. DVD-3 4.4.3.2 (5) Note) :

ERR_DVD_PCI_HLI_BTNGR_DSP_DUP

The same Decoding SP stream display type should not be used by different button groups.

>>> [DVD] ERROR 4568 (ref. DVD-3 4.4.3.2 (7..10)) :

ERR_DVD_PCI_HLI_BTN_NS

The specified number of buttons is larger than allowed :

- For the number of valid buttons (BTN_Ns), at least 1 and max 36, 18 or 12 for resp. 1, 2 or 3 button groups.
- For the U_BTNN selectable number of buttons (NSL_BTN_Ns), max 36, 18 or 12 for resp. 1, 2 or 3 button groups.
- For forcedly selected number of buttons (FOSL_BTNN), max 36, 18 or 12 for resp. 1, 2 or 3 button groups.
- For the forcedly activated number of buttons (FOAC_BTNN), max 36, 18 or 12 for resp. 1, 2 or 3 button groups or 63.

>>> [DVD] ERROR 4569 (ref. DVD-3 4.4.3.2 (9)) :

ERR_DVD_PCI_HLI_NSLS_BTN_NS

The U_BTNN selectable number of buttons (NSL_BTN_Ns) is larger than the number of buttons per button group (BTN_Ns).



>>> [DVD] ERROR 4570 (ref. DVD-3 4.4.3.2 (5)) :
 ERR_DVD_PCI_HLI_NO_BTNGR_DSP

The display mode of the (VTS_V_ATR) Video attribute allows for Pan-scan or Letterbox presentation and no matching button group is defined.

4.4.17.4 BTNIT Checks

>>> [DVD] ERROR 4571 (ref. DVD-3 4.4.3.4 (a)) :
 ERR_DVD_PCI_HLI_BTN_COLN

The button's Button Color number should be 1,2 or 3.

>>> [DVD] ERROR 4572 (ref. DVD-3 4.4.3.4 (a)) :
 ERR_DVD_PCI_HLI_BTN_POSI_ACT

A button's BTN_POSI specifies a reserved Auto action mode value (> 01b).

>>> [DVD] ERROR 4573 (ref. DVD-3 4.4.3.4 (a)) :
 ERR_DVD_PCI_HLI_BTN_POSI

A button's BTN_POSI specifies an X or Y, start or end-coordinate outside the valid range :

0..719 for X-coordinates

2..479 or 2..574 for Y-coordinates in resp. 525/60 or 625/50 TV systems.

>>> [DVD] ERROR 4576 (ref. DVD-3 4.4.3.4 (b)) :
 ERR_DVD_PCI_HLI_AJBTN_POSI_ILL

A button's AJBTN_POSI specifies a button number outside the valid range for the number of groups defined (i.e. 1..12,18 or 36 for resp. 1,2 or 3 groups).

>>> [DVD] ERROR 4577 (ref. DVD-3 4.4.3.4 (b)) :
 ERR_DVD_PCI_HLI_AJBTN_POSI_DEF

A button's AJBTN_POSI specifies an undefined Button number, i.e. a button whose BTNI fields are all

4.4.17.5 RECI Checks

>>> [DVD] ERROR 4581 (ref. DVD-3 Table T-1) :
 ERR_DVD_PCI_ISRC_CHAR_CODE

One of the ISRC fields for Country Code or Copyright Holder Code, specifies a character code other than these specified by Annex T, Table T-1 (should be 0..9 or 17..42).

>>> [DVD] ERROR 4582 (ref. DVD-3 Annex T Note 2) :
 ERR_DVD_PCI_ISRC_BCD_CODE

One of the ISRC fields for Recording Year or Recording Number, specifies a non-BCD code.

>>> [DVD] ERROR 4585 (ref. DVD-3 4.4.4 (4)) :
 ERR_DVD_PCI_ISRC_SP_SEL_GR_SET
 More than one SP_GR[#n] group is set to 1.

4.4.18 DVD DSI checks

Assumptions

[A1] Angle change jumps are restricted to the current VOB.

>>> [DVD] INFORMATION 4601 (ref. N/A) :

ERR_DVD_DSI_NO_XCHECK_PARAS

Necessary cross check parameters not found on the cross check data file ! Certain DSI checks will use default values for missing cross check parameters:

cross check parameter	default value
Cell_Block_type	0
Number of Audio streams	dvd->VTS_AST_Ns
Number of Sub-picture streams	0
Seamless_Angle_Change_flag	0
Number of Angles	1

4.4.18.1 DSI_GI Checks

>>> [DVD] ERROR 4610 (ref. DVD-3 4.5.1 (1)) :

ERR_DVD_DSI_NV_PCK_SCR

The NV_PCK_SCR value is different from the SCR lower 32 bit SCR_base value of the NV_PCK which contains this DSI.

>>> [DVD] ERROR 4611 (ref. DVD-3 4.5.1 (2)) :

ERR_DVD_DSI_NV_PCK_LBN

The NV_PCK_LBN value is different from the relative address of the VOBU which contains this DSI.

>>> [DVD] ERROR 4612 (ref. DVD-3 4.5.1 (3)) :

ERR_DVD_DSI_VOBU_EA

The VOBU_EA value is different from the relative address of the last pack of the VOBU which contains this DSI.

- Here "relative address" is the number of packs from the start of the VOBU containing this DSI; i.o.w. it is the number of packs in the current VOBU, minus one.
- Checked at the end of a VOBU.

>>> [DVD] ERROR 4614 (ref. DVD-3 4.5.1 (4,5,6)) :

ERR_DVD_DSI_VOBU_REF_EA

This message covers incorrect addresses in 3 distinct data fields :

1. VOBU_1STREF_EA is not the relative address of the video pack containing the last data byte of the first encoded reference picture, which is an I-picture.
 2. VOBU_2NDREF_EA is not the relative address of the video pack containing the last data byte of the 2nd encoded reference picture, which might be an I- or P-picture.
 3. VOBU_3RDREF_EA is not the relative address of the video pack containing the last data byte of the 3rd encoded reference picture, which might be an I- or P-picture.
- Here "relative address" is the number of packs from the start of the VOBU containing this DSI; i.o.w. it is the number of packs between the start of the current VOBU and the specified video pack, minus one.
 - These addresses do not have to be different, e.g. in case of very 'small' pictures.
 - Checked at the end of a VOBU.



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>>> [DVD] ERROR 4615 (ref. DVD-3 4.5.1 (4,5,6)) :

ERR_DVD_DSI_VOBU_REF_ORD

This message covers 2 distinct errors :

1. The VOBU_2NDREF_EA value is smaller than the VOBU_1STREF_EA value, or VOBU_3RDREF_EA smaller than VOBU_1STREF_EA or VOBU_2NDREF_EA.
2. One of the data fields VOBU_1STREF_EA, VOBU_2NDREF_EA or VOBU_3RDREF_EA is larger than the VOBU_EA value.

>>> [DVD] ERROR 4616 (ref. DVD-3 4.5.1 (4,5,6)) :

ERR_DVD_DSI_VOBU_REF_0

This message covers errors in 3 distinct data fields :

1. VOBU_1STREF_EA is not zero and the VOBU contains no video data (thus no I-picture).
 2. VOBU_2NDREF_EA is not zero and the VOBU has no 2nd reference picture encoded.
 3. VOBU_3RDREF_EA is not zero and the VOBU has no 3rd reference picture encoded.
- Checked at the end of a VOBU.

>>> [DVD] ERROR 4617 (ref. DVD-3 4.5.1 (7)) :

ERR_DVD_DSI_VOBU_VOB_IDN

An illegal VOB ID number VOBU_VOB_IDN has been specified. This message covers two possible errors :

1. Zero ID number
2. ID number which is more than 1 higher than the previous value.

>>> [DVD] ERROR 4618 (ref. DVD-3 4.5.1 (8)) :

ERR_DVD_DSI_VOBU_C_IDN

An illegal Cell ID number VOBU_C_IDN has been specified. This message covers two possible errors :

1. Zero ID number
2. ID number which is more than 1 higher than the previous value.

>>> [DVD] ERROR 4619 (ref. DVD-3 4.5.1 (9)) :

ERR_DVD_DSI_VOBU_C_ELT

The specified C_ELT value in this DSI is different from the C_ELT value specified in the PCI.

4.4.18.2 SML_PBI Checks

>>> [DVD] ERROR 4621 (ref. DVD-3 4.5.2 (1)) :

ERR_DVD_DSI_VOB_NO_PREU

A VOB is allocated in a Contiguous Block and connected seamlessly with the next VOB in an Interleaved Block, and the former VOB is not defined as PREU.

>>> [DVD] ERROR 4622 (ref. DVD-3 4.5.2 (1)) :

ERR_DVD_DSI_PREU_SHORT

The PREU contains not enough VOBUs to cover at least 75 or 90 video display fields for resp. a 625/50 (PAL) or 525/60 (NTSC) TV system.

>>> [DVD] ERROR 4623 (ref. DVD-3 4.5.2) :

ERR_DVD_DSI_PREU_DUR_SHORT

Combined duration of the VOBUs in the PREU is less then the time necessary to contain the necessary display fields.

>>> [DVD] ERROR 4624 (ref. DVD-3 4.5.2 (1)) :

ERR_DVD_DSI_PREU_ILVU_FLAG

This error message is generated in 2 distinct cases :

1. The PREU flag is set, but this VOBU is not part of a PREU, or the other way around.
2. The ILVU flag is set, but this VOBU is not part of a ILVU, or the other way around.

>>> [DVD] ERROR 4625 (ref. DVD-3 4.5.2 (1)) :

ERR_DVD_DSI_PREU_OR_ILVU

PREU and ILVU flags have both been set, which is not allowed.

>>> [DVD] ERROR 4626 (ref. DVD-3 4.5.2 (1)) :

ERR_DVD_DSI_UNIT_STRT_END

This error message is generated in 4 distinct cases :

1. The Unit Start flag is set, but this VOBU is not at the beginning of a PREU or ILVU.
2. The Unit End flag is set, but this VOBU is not at the end of a PREU or ILVU.
3. The Unit Start flag is not set, but this VOBU is at the beginning of a PREU or an ILVU.
4. The Unit End flag is not set, but this VOBU is at the end of a PREU or an ILVU.

>>> [DVD] ERROR 4627 (ref. DVD-3 4.5.2 (1)) :

ERR_DVD_DSI_UNIT_STRT_OR_END

Unit Start and End flags have both been set, which is not allowed.

>>> [DVD] ERROR 4629 (ref. DVD-3 4.5.2 (1)) :

ERR_DVD_DSI_PREU_SEQEND

A sequence_end_code occurs in this VOB which has been defined as PREU.

>>> [DVD] ERROR 4630 (ref. DVD-3 4.5.2 (2,3,4)) :

ERR_DVD_DSI_ILVU_XX_0

One of the data fields ILVU_EA, NXT_ILVU_SA or NXT_ILVU_SZ is not zero while the ILVU flag is not set.

>>> [DVD] ERROR 4631 (ref. DVD-3 4.5.2 (2)) :

ERR_DVD_DSI_ILVU_EA_ADD

ILVU_EA is different from the relative address of the last pack in this ILVU.

>>> [DVD] ERROR 4632 (ref. DVD-3 4.5.2 (3)) :

ERR_DVD_DSI_ILVU_SA_ADD

NXT_ILVU_SA is different from the relative address of the first pack in the next ILVU with the same VOB_IDN.

>>> [DVD] ERROR 4633 (ref. DVD-3 4.5.2 (3)) :

ERR_DVD_DSI_ILVU_SA_LAST

NXT_ILVU_SA is not 0xFFFFFFFF while this VOBU is part of the last ILVU of this VOB.

>>> [DVD] ERROR 4635 (ref. DVD-3 4.5.2 (4)) :

ERR_DVD_DSI_ILVU_SZ

NXT_ILVU_SZ does not equal the size (as a number of LBs) of the next ILVU with the same VOB_IDN.

>>> [DVD] ERROR 4636 (ref. DVD-3 4.5.2 (4)) :

ERR_DVD_DSI_ILVU_SZ_NONE

NXT_ILVU_SZ is not 0xFFFF while no next ILVU exists.

>>> [DVD] ERROR 4640 (ref. DVD-3 4.5.2 (5..8)) :

ERR_DVD_DSI_VOB_DATA_IDENT

One of the data fields VOB_V_S_PT, VOB_V_E_PT, VOB_A_STP_PT or VOB_A_GAP_LEN is not identical in every VOBU of this VOB.

>>> [DVD] ERROR 4641 (ref. DVD-3 4.5.2 (5)) :



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ERR_DVD_DSI_VOB_V_S_PT

The **VOB_V_S_PT** is different from the presentation start time of the first video frame (in display order !) of the first GOP in this VOB.

Recall that video data is always present in the first VOBU of a VOB.

- Checked at the end of the very first VOBU.

>>> [DVD] ERROR 4642 (ref. DVD-3 4.5.2 (6)) :

ERR_DVD_DSI_VOB_V_E_PT

VOB_V_E_PT is different from the presentation termination time of the last video frame (in display order !) of the last GOP in this VOB and video data is present in the last VOBU of the VOB.

=**VOBU_E_PT** of the last VOBU of the VOB.

- Checked at the end of a VOB.

>>> [DVD] ERROR 4643 (ref. DVD-3 4.5.2 (6)) :

ERR_DVD_DSI_VOB_V_E_PT_M

If no video data is present in the last VOBU of the VOB or the video has stopped earlier, then imaginary video is to be used : **VOB_V_E_PT** does not specify a display time on video grid.

- Checked at the end of a VOB.

>>> [DVD] ERROR 4645 (ref. DVD-3 4.5.2) :

ERR_DVD_DSI_VOB_V_STC_OF

>>> [DVD] ERROR 4651 (ref. DVD-3 4.5.2 (7,8)) :

ERR_DVD_DSI_VOB_A_NON_ILVU

One of the **VOB_A_STP_PT** or **VOB_A_GAP_LEN** data fields is not zero while not in an Interleaved Block.

>>> [DVD] ERROR 4652 (ref. DVD-3 4.5.2 (7,8)) :

ERR_DVD_DSI_VOB_A_NOTPRES_0

One of the **VOB_A_STP_PT** or **VOB_A_GAP_LEN** data fields is not zero for one (of the 8 possible) audio streams which is not present.

>>> [DVD] ERROR 4653 (ref. DVD-3 4.5.2 (7,8)) :

ERR_DVD_DSI_VOB_A_NODISC_0

This error message is generated in the 2 following cases :

1. One of the **VOB_A_STP_PT** or **VOB_A_GAP_LEN** data fields is not zero while there are no discontinued points.
2. One of the **VOB_A_STP_PT** or **VOB_A_GAP_LEN** data fields is not zero while there is only one discontinued point.

>>> [DVD] ERROR 4655 (ref. DVD-3 4.5.2 (7)) :

ERR_DVD_DSI_VOB_A_STP_PT

One of the **VOB_A_STP_PT** values is different from the matching stop time of the audio at the discontinuity.

>>> [DVD] ERROR 4656 (ref. DVD-3 4.5.2 (7)) :

ERR_DVD_DSI_VOB_A_STP_PT_S

This error message is generated in 2 distinct cases :

1. **VOB_A_STP_PT** is smaller than 40 msec.
2. **VOB_A_STP_PT** is smaller than (or equal to) **VOB_A_STP_PT**.

>>> [DVD] ERROR 4657 (ref. DVD-3 4.5.2 (7)) :

ERR_DVD_DSI_VOB_A_STP_PTM1

This error message is generated in one of the 2 following cases :

1. The specified VOB_A_STP_PTM1 & VOB_A_GAP_LEN1 combination exceeds the specified video presentation termination time VOB_V_E_PTM :

VOB_A_STP_PTM1 + VOB_A_GAP_LEN1 + 40ms > VOB_V_E_PTM

2. The specified VOB_A_STP_PTM2 & VOB_A_GAP_LEN2 combination exceeds the specified video presentation termination time VOB_V_E_PTM :

VOB_A_STP_PTM2 + VOB_A_GAP_LEN2 + 40ms > VOB_V_E_PTM

>>> [DVD] ERROR 4658 (ref. DVD-3 4.5.2 (7)) :

ERR_DVD_DSI_VOB_A_STP_PTM2

The specified VOB_A_STP_PTM1 & VOB_A_GAP_LEN1 combination exceeds the 2nd audio presentation stop time VOB_A_STP_PTM2 :

VOB_A_STP_PTM1 + VOB_A_GAP_LEN1 + 1 sec > VOB_A_STP_PTM2

>>> [DVD] ERROR 4659 (ref. DVD-3 4.5.2 (8)) :

ERR_DVD_DSI_VOB_A_GAP_LEN

The VOB_A_GAP_LEN value is different from the discontinuation period of audio at the discontinued point.

4.4.18.3 SML_AGLI Checks

Observations :

1. An Angle Block (AGL_C_BLK) consists of max. 9 Angles, each composed of exactly 1 Angle Cell (AGL_C).
2. One AGL_C consists of an integer number of ILVUs, of which the start address is described by the DSI SML_AGLI data.
3. The SML_AGLI data describes a sequential ‘slice’ of a complete Angle Block, containing always a part (of identical duration) of each of the 9 possible Angle Cells.
4. Each ILVU consists of an integer number of VOBUs, possible more than 1.

Used Cross Check Parameters :

A dedicated flag "Seamless_Angle_Change_flag" & parameter "Cell_Block_type" have been defined & used for these checks. These match a field with the same name of the PGCI - C_PBI - C_CAT data structure (cf. [DVD-3] Table 4.3.5-1 (1)) and is made available through the Xcheck data file. Also the number of Angles defined in the current Title (defined by the VMGI - TT_SRPT - TT_SRP(i) - AGL_Ns field, cf. [DVD-3] Table 4.1.2-2) is passed through the Xcheck data file.

As a consequence, the checks using any of these parameters can only be properly performed when the proper Cross Checks data (file) is present. If this file is missing, rather than disabling these checks, the necessary parameters otherwise retrieved from this file, are given their default value (which in most cases comes down to a de facto disabling of the checks) :

Parameter	Value	Comment
Seamless_Angle_Change_flag	0 (FALSE)	Non-Seamless Angle Change
Cell_Block_type	1	No Angle Block
AGL_Ns	1	No Angles

>>> [DVD] ERROR 4660 (ref. DVD-3 4.5.3) :



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ERR_DVD_DSI_SML_AGLI_NOT0

This error message is generated in 2 distinct cases, when one of the SML_AGL_C[#n]_DSTA entries is not zero and :

1. no Angle Block exists
2. the Angle Block is non-seamless

>>> [DVD] ERROR 4661 (ref. DVD-3 4.5.3) :

ERR_DVD_DSI_SML_AGLI_NR

The n-th SML_AGLI_C[#n]_DSTA entry contains a non-zero value, although there are fewer than n angles defined (by the VMGI.TT_SRPT.TT_SR(i).AGL_Ns field, cf. [DVD-3] Table 4.1.2-2 (2)).

>>> [DVD] ERROR 4662 (ref. DVD-3 4.5.3) :

ERR_DVD_DSI_SML_AGLI_0

The n-th SML_AGLI_C[#n]_DSTA entry contains a zero value, although a Seamless Angle Change has been indicated defined (by the Seamless_Angle_Change_flag, cf. above).

>>> [DVD] ERROR 4663 (ref. DVD-3 4.5.3) :

ERR_DVD_DSI_SML_AGLI_LOC

The n-th SML_AGLI_C[#n]_DSTA entries AGL_C location flag is not zero, which is the only value allowed.

>>> [DVD] ERROR 4664 (ref. DVD-3 4.5.3) :

ERR_DVD_DSI_SML_AGLI_STRT

The n-th SML_AGLI_C[#n]_DSTA entry AGL_C field specifies an incorrect (non-existing) destination ILVU start address.

>>> [DVD] ERROR 4665 (ref. DVD-3 4.5.3) :

ERR_DVD_DSI_SML_AGLI_LAST

The n-th SML_AGLI_C[#n]_DSTA entry AGL_C field destination ILVU start address has not the mandatory 0x7FFFFFFF value for every DSi in (each VOBU of) the last ILVU of a Cell.

- Checked at the end of an ILVB, by verifying all AGL_C references still stored in the reference list. These should all belong to the last ILVU of a Cell and have their AGL_C destination ILVU start address set to 0x7FFFFFFF.

>>> [DVD] ERROR 4666 (ref. DVD-3 4.5.3) :

ERR_DVD_DSI_SML_AGLI_NLAST

The n-th SML_AGLI_C[#n]_DSTA entry AGL_C field destination ILVU start address has the value 0x7FFFFFFF while this DSi does not belong to a VOBU of the last ILVU of a Cell.

- Checked at the end of an ILVB, by verifying all AGL_C references still stored in the reference list. If these don't have their AGL_C destination ILVU start address set to 0x7FFFFFFF, they should not belong to the last ILVU of a Cell.

>>> [DVD] ERROR 4667 (ref. DVD-3 4.5.3) :

ERR_DVD_DSI_SML_AGLI_SIZE

The n-th SML_AGLI_C[#n]_DSTA entry AGL_C field specifies an incorrect destination ILVU size.

>>> [DVD] ERROR 4668 (ref. DVD-3 4.5.3) :

ERR_DVD_DSI_SML_AGLI_SIZE_0

The n-th SML_AGLI_C[#n]_DSTA entry AGL_C field destination ILVU size is not zero while the ILVU flag is not set.

>>> [DVD] ERROR 4669 (ref. DVD-3 4.5.3) :

ERR_DVD_DSI_SML_AGLI_L_SIZE

The n-th SML_AGLI_C[#n]_DSTA entry AGL_C field destination ILVU size is not zero for the last ILVU of a Cell.

- Checked at the end of an ILVB, by verifying all AGL_C references still stored in the reference list. These should all belong to the last ILVU of a Cell and have their AGL_C destination ILVU size set to zero.

4.4.18.4 VOBU_SRI Checks

- The following VOBU_SRI checks are used, unless specified explicitly otherwise, for both FWD and BWD versions; This is referred to below as "F/BWD".
- Furthermore, the (error) messages may result from any of the 42 VOBU_SRI table F/BWDI entries, unless a specific entry, e.g. "F/BWDI Video", "FWDI Next" or "BWDI Prev", is specified.
- The term "predecessor" for VOBU_SRI entry (i) is interpreted as the VOBU matching the VOBU_SRI table entry (i-1). In other words, the VOBU one entry closer to the current VOBU.
- The verification of the VOBU_SRI table entries is done separately for forward & backward references :
 - backward references (BWDI) are checked immediately using a "VOBU" list with all the VOBUs in the part of the Cell preceding the current VOBU. This entry contains all necessary information for the checks (relative address, start time, video flag, etc.).

This list is a generic list with VOB scope generated & maintained by the *vob_verf* object.

- forward references (FWDI) are checked whenever one VOBU referenced by a DSI in the preceding part of the Cell is encountered. Therefore two "ref" lists are used containing all forward VOBU_SRI references not checked yet : one to verify references to existing VOBUs; the second one to verify missing references.

Since all these references are restricted to the current Cell, these "ref" lists are generated during the current Cell parsing, valid for the current Cell only and destroyed at the end of a Cell.

>>> [DVD] ERROR 4671 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWD_EX_1

The V_F/BWD_Exist1 flag specifies incorrectly (non-)existing video data in the destination VOBU.

- Checked at VOBU end in case of forward reference FWDI.

>>> [DVD] ERROR 4672 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWD_EX_1_0

The V_F/BWD_Exist1 flag is not zero while the destination VOBU does not exist.

- Checked immediately also in case of forward reference FWDI.



>>> [DVD] ERROR 4673 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWD_EX_2

This error message is generated in 2 distinct cases :

When the V_F/BWD_Exist2 flag specifies incorrectly (non-)existing video data between the VOBU to be presented just after/before the predecessor and

1. the VOBU to be presented just before/after VOBU addressed by F/BWDA[#n].
 2. the last/first VOBU in the Cell, in case the VOBU addressed by F/BWDA[#n] does not exist.
- Checked at VOBU and Cell end in case of forward reference FWDI.

>>> [DVD] ERROR 4674 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWD_EX_2_0

The V_F/BWD_Exist2 flag is not zero while both the destination VOBU and the predecessor do not exist.

- Checked at Cell end in case of forward reference FWDI.

>>> [DVD] ERROR 4675 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWD_EX_2_1

The V_F/BWD_Exist2 flag is not zero for one of the VOBU_SRI entries F/BWDI 1 to F/BWDI 15.

- Checked immediately, also in case of forward reference FWDI.

>>> [DVD] ERROR 4677 (ref. DVD-3 4.5.4 (2,5)) :

ERR_DVD_DSI_SRI_FBWD_EX_1_FLST

The FWDI Next V_FWD_Exist1 / FWDI Prev V_BWD_Exist1 flag is not zero for the last/first VOBU of a Cell.

- Checked at Cell end in case of forward reference FWDI.

>>> [DVD] ERROR 4678 (ref. DVD-3 4.5.4) :

ERR_DVD_DSI_SRI_FBWD_EX_1_V

>>> [DVD] ERROR 4679 (ref. DVD-3 4.5.4) :

ERR_DVD_DSI_SRI_FBWD_EX_2_V

>>> [DVD] ERROR 4680 (ref. DVD-3 4.5.4) :

ERR_DVD_DSI_SRI_FBWDA_ILL

F/BWDA specifies an illegal VOBU relative start address. More specifically a sector address is specified which is not a NV_PCK marking the start of a VOBU.

- Checked at VOBU end in case of forward reference FWDI.

>>> [DVD] ERROR 4681 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWDA_ERR

F/BWDA specifies an incorrect VOBU relative start address.

- Here "relative address" is the packs count from the start of the current VOBU, but within the current Cell! Note that, when the reference exceeds the cell boundaries it is considered incorrect.
- Checked at VOBU end in case of forward reference FWDI.

>>> [DVD] ERROR 4682 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWDA_S_PTM

F/BWDA specifies a VOBU that is not being presented ($n \times 0.5$ sec) after/before the current VOBU presentation start time, as is required for F/BWDI entry #n.

In principle is required (for forward references) :

$$\text{VOBU_S_PTM}_{\text{target VOBU}} = \text{VOBU_S_PTM}_{\text{current VOBU}} + (n \cdot 0.5\text{sec})$$

In practice this becomes :

$$\text{VOBU_S_PTM}_{\text{target VOBU}} \leq \text{VOBU_S_PTM}_{\text{current VOBU}} + (n \cdot 0.5\text{sec})$$

$$\text{VOBU_E_PTM}_{\text{target VOBU}} > \text{VOBU_S_PTM}_{\text{current VOBU}} + (n \cdot 0.5\text{sec})$$

For backward references the plus sign has to be replaced by a minus sign.

- Checked at VOBU end in case of forward reference FWDI.

>>> [DVD] ERROR 4683 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWDA_ERRPOS

F/BWDA specifies a VOBU start address after/before the current Cell end/start.

(This is simply verified by comparing the F/BWDA value with the relative address of the current VOBU within the current Cell.)

- Checked at Cell end in case of forward reference FWDI.

>>> [DVD] ERROR 4684 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWDA_EXST

F/BWDA specifies an existing destination VOBU, i.e. start address different from 0x3FFFFFFF, while the target VOBU does not exist.

- Checked at VOBU end in case of forward reference FWDI.

>>> [DVD] ERROR 4685 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWDA_N_EXST

F/BWDA specifies a non-existing destination VOBU, i.e. start address equals 0x3FFFFFFF, while the target VOBU does exist.

- Checked at VOBU and Cell end in case of forward reference FWDI.

>>> [DVD] ERROR 4686 (ref. DVD-3 4.5.4 (1,4)) :

ERR_DVD_DSI_SRI_FBWDA_TIMEX

BWDA[#n] specifies a VOBU start address different from 0x3FFFFFFF while the relevant time exceeds the Cell's presentation start time.

! This is not checked for FWDA[#n], since the Cell presentation termination time is not known in advance.

>>> [DVD] ERROR 4687 (ref. DVD-3 4.5.4) :

ERR_DVD_DSI_SRI_FBWDA_EXST_FLST

FWDI Next FWDA is not 0x3FFFFFFF for the last VOBU of a Cell, or

BWDI Prev FWDA and BWDI Video FWDA is not 0x3FFFFFFF for the first VOBU of a Cell.

- Checked at Cell end in case of forward reference FWDI.



>>> [DVD] ERROR 4689 (ref. DVD-3 4.5.4) :
ERR_DVD_DSI_SRI_FBWD_NOPRED
No predecessor was found although expected to be present !

- This is not a real DVD specification violation, but rather a system message.

4.4.18.5 SYNCI Checks

Remarks :

- The following SYNCI checks are used for both A_SYNCA and SP_SYNCA table entries, unless specified otherwise.
- The verification of the SYNCI table entries is done separately for forward & backward references :
 - backward references are checked immediately using a "pack" list with all the packs in the part of the VOB preceding the current VOBU. This entry contains all necessary information for the checks (relative address, start time, etc.).
 - forward references are checked whenever a VOBU referenced by the current DSI in the preceding part of the VOB is encountered. Therefore a "ref" list, sorted in ascending order on the absolute pack address, is used containing all forward SYNCI references not yet checked.

Of both lists, there are two instances : one for Audio packs (A_PCK), one for Sub-picture packs (SP_PCK).

Since all these references are restricted to the current VOB, these lists are generated during the current VOB parsing, valid for the current VOB only and destroyed at the end of a VOB.

To verify the presentation start time of the target A/SP_PCK specified by A/SP_PCKA, the above mentioned pack list is extended with the presentation start time of each pack as defined by the specification.

- The constraint :

When there are less than 32 SP streams, the SP_PCK location flag and SP_PCKA address should be zero.

has precedence over the constraint :

When SP_PCK location flag == 0, then the SP_PCKA address should have all its bits set.

- When SP_PCKs are located AFTER the current NV_PCK, no reference to them is necessary for correct DVD data handling (in this case the SP_PCK location flag is set to zero and SP_PCKA has all its bits set). So, no forward sub-picture references have to be verified and no list is needed to store them.
- The SP_PCK location flag has two meanings :
 1. Specify the target SP_PCK location w.r.t. the current NV_PCK
 2. Indicate there is no target SP_PCK (all bits of SP_PCKA are set)
- Interpretation of combined SP_PCK location flag and SP_PCKA values :

SP_PCKA should not be filled in when :

1. The SP_PCK location flag == 0 ➔ It should have all its bits set.
2. The VOBU specified by SP_PCKA contains no video ➔ It is not clear what value SP_PCKA then should contain, but all zero is assumed.

Used Cross Check Parameters :

For verification, the number of audio and sub-picture streams present in the VOB is needed. These values can not directly be retrieved from the VOB data but are only available in the DVD VTSI data structure : specified by resp. VTSI.VTSI_MAT.VTS_AST_Ns and .VTS_SPST_Ns (cf. [DVD-3] 4.2.1 RBP 514 and 596). They are passed by the Xcheck data file.

As a consequence, the checks using one of these parameters can only be properly performed when the proper Cross Checks data (file) is present. If this file is missing, rather than disabling these checks, the necessary parameters otherwise retrieved from this file, are given their default value (which in case of Sub-picture streams comes down to a de facto disabling of the checks) :

Parameter	Default Value	Comment
AST_Ns	The dvd_core VTS_AST_NS field	Indirectly retrieved from the script file settings
SPST_Ns	0	No Sub-pictures

>>> [DVD] ERROR 4690 (ref. DVD-3 4.5.5 (1,2)) :

ERR_DVD_DSI_SYNCL_PCK_ADD

The specified relative address does not match an existing A/SP_PCK.

- Here "relative address" is the packs count from the start of the current NV_PCK.
- Generated when a search scan of the VOBU absolute address list for a VOBU matching the specified relative address A/SP_PCKA fails.
- For backward references, this message is generated when a search scan of the pack absolute address list for a pack matching the specified relative address A/SP_PCKA fails.
- To check forward references, the current pack address is continuously compared with that of the first entry of the pack "ref" list. When the first address is beyond the second one, i.e. the current stream position has passed the position of the first unchecked reference, this message is generated.

>>> [DVD] ERROR 4691 (ref. DVD-3 4.5.5 (1,2)) :

ERR_DVD_DSI_SYNCL_PCK_TIME

The target A/SP_PCK contains an AU with a presentation time which is not simultaneously with nor immediately after the current VOBU presentation start time.

- This AU consists of an audio frame in case of an A_PCK, or the first packet of the first SPU in case of a SP.
- Only when the target VOBU is found in the VOBU address list, the presentation start time stored in the list is compared with that of the current VOBU. The first should then be properly set to the PTS of the appropriate AU, resp. the first audio frame or first SPU packet.
- The term "immediately after" is interpreted as described for the PCI.NSML_AGLI Destination address of AGL_C[#n] (cf. [DVD-3] 4.4.2) : the closest later PTM than the current VOBU 's PTM.

>>> [DVD] ERROR 4692 (ref. DVD-3 4.5.5 (1,2)) :

ERR_DVD_DSI_SYNCL_PCK_STRM

The A/SP_PCK location and A/SP_PCKA fields should be zero for non-present audio or sub-picture streams.

- When the relevant Cross Check parameters are not available, the checks are performed using parameter default values (which are logged to the verifier report).



>>> [DVD] ERROR 4693 (ref. DVD-3 4.5.5) :

ERR_DVD_DSI_SYNCI_PCK_EXST

The N-th A/SP_PCKA field is zero, indicating this audio or sub-picture stream does not exist, while it does, because there are more than N streams present.

>>> [DVD] ERROR 4694 (ref. DVD-3 4.5.5 (1)) :

ERR_DVD_DSI_SYNCI_A_PCK_LOC0

The A_PCK location flag is set while the target A_PCK does not exist.

- A_PCK location flag is not zero, while A_PCKA is.

- This is not explicitly stated in the spec and therefore is implemented as an ODDITY.

>>> [DVD] ERROR 4696 (ref. DVD-3 4.5.5 (1)) :

ERR_DVD_DSI_SYNCI_A_PCKA_EX

The A_PCKA target address does not have all bits set while the address value exceeds the maximum value.

- The target A_PCK is searched for in the VOBU list using the presentation start time of the current VOBU. When found, its relative address is checked to be within 15bit range.

>>> [DVD] ERROR 4697 (ref. DVD-3 4.5.5 (2)) :

ERR_DVD_DSI_SYNCI_SP_PCK_LOC0

The SP_PCK location flag is set while the target SP_PCK does not exist.

- SP_PCK location flag is not zero, while SP_PCKA is all zero or all 1.

>>> [DVD] ERROR 4699 (ref. DVD-3 4.5.5 (2)) :

ERR_DVD_DSI_SYNCI_SP_PCKA_V

The SP_PCK location flag is set but the SP_PCKA target VOBU does not contain the video data.

- This is checked by looking up the VOBU referenced by SP_PCKA in the current VOB's VOBU list and check its video flag.

>>> [DVD] ERROR 4700 (ref. DVD-3 4.5.5 (2)) :

ERR_DVD_DSI_SYNCI_SP_NO_PCK_TIME

SYNCI SP_SYNCA 'number' : No target SP_PCK found with a presentation start time which is simultaneously with, nor immediately after the matching VOBU presentation start time.

>>> [DVD] ERROR 4701 (ref. DVD-3 4.5.5 (1)) :

ERR_DVD_DSI_SYNCI_A_PCK_TIME

SYNCI A_SYNCA 'number' : The target A_PCK has a presentation start time 'value' which is not simultaneously with, nor immediately after the matching VOBU presentation start time 'value' (VOBU_S_PT at larger distance than 1 frame duration time).

>>> [DVD] ERROR 4702 (ref. DVD-3 4.5.5 (2)) :

ERR_DVD_DSI_SYNCI_SP_PCK_TIME

SYNCI SP_SYNCA 'number' : The target SP_PCK has a presentation start time 'value' which is not simultaneously with, nor immediately after the matching VOBU presentation start time.

>>> [DVD] ERROR 4703 (ref. DVD-3 4.5.5 (2)) :

ERR_DVD_DSI_SYNCI_SP_NO_VOBU

SYNCI SP_SYNCA 'number' : The specified SP_PCKA address 'address' does not match the NV_PCK's address of a VOBU including any SP-PCK.

4.4.19 DVD NCMD checks

>>> [DVD] ERROR 4801 (ref. DVD-3 4.6.3.2) :

ERR_DVD_NCMD_RES_ILL

The reserved field from Command_Type1 shall be '0'

>>> [DVD] ERROR 4802 (ref. DVD-3 4.6.4) :

ERR_DVD_NCMD_OPERAND_RES_ILL

The reserved field from the Command's Operand should be '0'

>>> [DVD] ERROR 4803 (ref. DVD-3 4.6.4) :

ERR_DVD_NCMD_RES_CMD

Illegal Command specified!!!

>>> [DVD] ERROR 4804 (ref. DVD-3 4.6.4) :

ERR_DVD_NCMD_ARG_RES_ILL

The reserved field from this Command's Argument should be '0'

>>> [DVD] ERROR 4805 (ref. DVD-3 4.6.4) :

ERR_DVD_NCMD_ARG_RES_VALUE

A field from the Command's argument specifies a reserved value.

>>> [DVD] ERROR 4810 (ref. DVD-3 4.6.4) :

ERR_DVD_NCMD_DOMAIL_ILL1

A Command is found in an illegal Domain .

>>> [DVD] ERROR 4811 (ref. DVD-3 4.6.4) :

ERR_DVD_NCMD_DOMAIN_ILL2

A Command is found in an illegal Domain.

>>> [DVD] ERROR 4812 (ref. DVD-3 4.6.4) :

ERR_DVD_NCMD_AREA_ILL1

A Command is found in an illegal Area.

>>> [DVD] ERROR 4813 (ref. DVD-3 4.6.4) :

ERR_DVD_NCMD_AREA_ILL2

A Command is found in an illegal Area.

>>> [DVD] ERROR 4814 (ref. DVD-3 4.6.4.1) :

ERR_DVD_NCMD_GOTO_ILL

A Command specified an illegal Command number.

>>> [DVD] ERROR 4815 (ref. DVD-3 4.6.4.1) :

ERR_DVD_NCMD_ILL_GMPGOTO

An Operand was used which may not be used in this command.

>>> [DVD] ERROR 4816 (ref. DVD-3 4.6.4) :

ERR_DVD_NCMD_PTL_ILL

A Command specified an illegal Parental_Level.



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>>> [DVD] ERROR 4820 (ref. DVD-3 4.6.4.2) :
ERR_DVD_NCMD_LINK_HLBUTTON_ILL

A Command specified an illegal HL_BTNN.

>>> [DVD] ERROR 4821 (ref. DVD-3 4.6.4.2) :
ERR_DVD_NCMD_LINK_HLBUTTON_ILL2

A Command specified an illegal HL_BTNN.

>>> [DVD] ERROR 4822 (ref. DVD-3 4.6.4.2) :
ERR_DVD_NCMD_LINK_S_RESV

A Reserved Link_sub_instruction was found.

>>> [DVD] ERROR 4823 (ref. DVD-3 4.6.4.2) :
ERR_DVD_NCMD_LINK_PGCN_ILL

A Command specified an illegal PGCN.

>>> [DVD] ERROR 4824 (ref. DVD-3 4.6.4.2) :
ERR_DVD_NCMD_LINK_PGN_ILL

A Command specified an illegal PGN.

>>> [DVD] ERROR 4825 (ref. DVD-3 4.6.4.2) :
ERR_DVD_NCMD_LINK_X_PGN

A Command specified a non-existing PGN.

>>> [DVD] ERROR 4826 (ref. DVD-3 4.6.4.2) :
ERR_DVD_NCMD_LINK_PTTN_ILL

A Command specified an illegal PTTN.

>>> [DVD] ERROR 4827 (ref. DVD-3 4.6.4.2) :
ERR_DVD_NCMD_LINK_CN_ILL

A Command specified an illegal CN.

>>> [DVD] ERROR 4828 (ref. DVD-3 4.6.4.2) :
ERR_DVD_NCMD_LINK_X_CN

A Command specified a non-existing CN.

>>> [DVD] ERROR 4835 (ref. DVD-3 4.6.4.3) :
ERR_DVD_NCMD_JUMP_CN_ILL

A Command specified an illegal CN.

>>> [DVD] ERROR 4836 (ref. DVD-3 4.6.4.3) :
ERR_DVD_NCMD_JUMP_TTN_ILL

A Command specified an illegal TTN.

>>> [DVD] ERROR 4837 (ref. DVD-3 4.6.4.3) :
ERR_DVD_NCMD_JUMP_VTS_TTN_ILL

A Command specified an illegal VTS_TTN.

>>> [DVD] ERROR 4838 (ref. DVD-3 4.6.4.3) :
ERR_DVD_NCMD_JUMP_VTSN_ILL

A Command specified an illegal VTSN.

>>> [DVD] ERROR 4839 (ref. DVD-3 4.6.4.3) :
ERR_DVD_NCMD_JUMP_VTSN_VTS_SPACE

A Command specified an illegal VTS.

>>> [DVD] ERROR 4840 (ref. DVD-3 4.6.4.3) :
 ERR_DVD_NCMD_JUMP_VMGM_PGCN_ILL
 A Command specified an illegal PGCN.

>>> [DVD] ERROR 4841 (ref. DVD-3 4.6.4.3) :
 ERR_DVD_NCMD_JUMP_DOAMINID
 The specified Domain_ID is illegal for the Menu_ID.

>>> [DVD] ERROR 4842 (ref. DVD-3 4.6.4.3) :
 ERR_DVD_NCMD_VMGMPGCN_DOMID
 The specified VMGM_PGCN should be '0x0000' for the Domain_ID.

>>> [DVD] ERROR 4850 (ref. DVD-3 4.6.4.5) :
 ERR_DVD_NCMD_SETSYS_PARAM
 The Parameter_Number exceeds the allowed maximum.

>>> [DVD] ERROR 4851 (ref. DVD-3 4.6.4.5) :
 ERR_DVD_NCMD_SETSYS_Ns
 If the I_flag for SetSystem Instruction is '0':
 1) If the A_flag is '0' then ASTN shall be '0',
 2) If the SP_flag is '0' then SPSTN shall be '0',
 3) If the AGL_flag is '0' then AGLN shall be '0'

>>> [DVD] ERROR 4852 (ref. DVD-3 4.6.4.5) :
 ERR_DVD_NCMD_SETSYS_Ns_MAX
 The ASTN, SPSTN or AGLN is illegal with the used flag.

>>> [DVD] ERROR 4853 (ref. DVD-3 4.6.4) :
 ERR_DVD_NCMD_GEN_PARAM
 The General_Parameter_Number should be maximum 15 for this PRM_Flag.

>>> [DVD] ERROR 4854 (ref. DVD-3 4.6.4) :
 ERR_DVD_NCMD_SYS_PARAM
 The System_Parameter_Number should be maximum 23 for this PRM_Flag.

>>> [DVD] ERROR 4855 (ref. DVD-3 4.6.4.5) :
 ERR_DVD_NCMD_SYS_PARAM_ILL_CMD
 No System_Parameter_Number should be specified for this Set_Field.

>>> [DVD] ERROR 4860 (ref. DVD-3 4.6.4.5) :
 ERR_DVD_NCMD_IMN_VALUE_ILL
 No Immediate_Value should be specified for this Set_Field.

>>> [DVD] ERROR 4861 (ref. DVD-3 4.6.4.5) :
 ERR_DVD_NCMD_GPRMN_ILL
 ASTN GPRMN should be '0' when the A_flag is '0'.
 SPSTN GPRMN should be '0' when the SP_flag is '0'.
 AGLN GPRMN should be '0' when the AGL_flag is '0'.

>>> [DVD] ERROR 4862 (ref. DVD-3 4.6.4.5) :
 ERR_DVD_NCMD_SPDISPFLAG
 The SP_Disp_Flag should be '0' when the SP_Flag is '0'.



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>>> [DVD] ERROR 4863 (ref. DVD-3 4.6.4.5) :

ERR_DVD_NCMD_HL_BTNN_NULL

The HL_BTNN value should not be when specified in this command.

>>> [DVD] ERROR 4864 (ref. DVD-3 4.6.4.5) :

ERR_DVD_NCMD_HL_BTNN_LARGE

The HL_BTNN should maximum be 36.

>>> [DVD] SYNTAX ERROR 4870 (ref. DVD-3 4.3.3-1) :

ERR_DVD_PGC_CMD_LARGE

PGC_CMDT: The number of combined commands is larger then allowed. Only 128 PRE_CMDs are parsed!!!

4.4.20 DVD Sector checks

The checks, which comprise the verification of a sector, are all based on the data sector as defined in [DVD] 3.2.

>>> [DVD] ERROR 4951 (ref. DVD-1 3.1.4) :

ERR_SECTOR_NUMBER

The physical sector number must correspond to the logical sector number. Depending on the type of disc (Single/Dual layer, Parallel/Opposite track) a relation between the logical sector number and physical sector number is verified. The error notification contains the values of the logical and physical sector number.

>>> [DVD] ERROR 4952 (ref. DVD-1 3.2.2) :

ERR_SECTOR_ID

The reserved field of the Sector information (of the Identification Data) must be zero.

>>> [DVD] ERROR 4953 (ref. DVD-1 3.2.3) :

ERR_SECTOR_IED

This is a CRC check. The CRC value calculated over the Identification Data must be equal to the value of the ID Error Detection Code. The error notification contains the value of the calculated remainder.

>>> [DVD] ERROR 4954 (ref. DVD-1 3.2.4) :

ERR_SECTOR_CPR_MAI

The following requirements must be met:

- If the data sector is part of the lead-in area and the relative sector number is at least 2 and at most 15, the CPR_MAI must be according to [DVD] 3.2.4.1. This is the contents provider information. Three aspects must be verified: First, the value of CPS_TY must be either zero or one. Second, the CPR_MAI contains four reserved bytes. Finally, the in this item discussed sectors must have the same values for the CPS_TY and RMA attributes.
- If the data sector is part of the lead-in area and the relative sector number is smaller than 2 or larger than 15, the CPR_MAI must be set to '0' in all bits.
- If the data sector is part of the data area, the CPR_MAI must be according to [DVD] 3.2.4.2. The CPR_MAI contains some copyright information, but also some reserved fields. These reserved fields must contain the value zero.
- If the data sector is part of the middle or lead-out area, the CPR_MAI must be set to '0' in all bits.

>>> [DVD] ERROR 4955 (ref. DVD-1 3.2.4.1) :

ERR_SECTOR_CPR_RMA

An oddity message is generated when the disc is not allowed to be played in any region. For a lead-in sector with relative sector number in [2..15], not all the RMA values may be one.

>>> [DVD] ERROR 4956 (ref. DVD-1 3.2.5) :

ERR_SECTOR_EDC

This is a CRC check. The CRC value of the Data Sector, without the EDC value, must be equal to the EDC value. The error notification contains the value of the calculated remainder.

4.4.21 Filesystem checks

4.4.21.1 UDF Filesystem checks

>>> [DVD] ERROR 5001 (ref. DVD-2 2.1.2, ECMA 3/8.1.2) :

ERR_FSYS_WRONG_SECTOR_SIZE

The logical sector size must be a multiple of 512 bytes. Furthermore, according to [UDF], the sector size must be 2048.

>>> [DVD] ERROR 5002 :

ERR_FSYS_WRONG_DISC_TYPE

Wrong or unknown disc (image) type.

>>> [DVD] ERROR 5003 (ref. ECMA 3/8.1.3) :

ERR_FSYS_NLOGICAL_SECTOR_TOO_SMALL

Logical sector numbers shall be consecutive integers in ascending order. The smallest logical sector number of a volume shall be 0, the largest shall be greater than 256.

>>> [DVD] ERROR 5004 :

ERR_FSYS_NO_FILE

Could not open/read disc (image).

>>> [DVD] ERROR 5005 :

ERR_FSYS_SECTOR_NOT_FOUND

The addressed sector could not be found.

>>> [DVD] ERROR 5006 :

ERR_FSYS_SECTOR_NOT_READ

The addressed sector could not be read.

4.4.21.1.1 DVD Filesystem ECMA1 checks

The checks which comprise the verification of the [UDF] file system are listed according to the following scheme: The required checks are presented by following the [ECMA] standard. The standard is partitioned into four parts and the required checks are presented analogous to this standard.

Occasionally, checks refer to DVD-2. The verifier for the DVD file system will be initialised with a Boolean indicating whether or not a DVD-2 disk will be verifier. Checks which should only be performed for DVD-2 disks should be guarded using this initially passed value.



The DVD file system is based on three standards. The basis is the [ECMA] standard. On top of this there is the [UDF] standard. Every definition that complies to [UDF] also complies to [ECMA]. The [UDF] standard is a ‘smaller’ definition. Finally, the [DVD] standard is defined on top of the [UDF] standard. Every check that needs to be performed originates from one (or more) of these standards. If a certain requirement is stated in more than one standard, a reference to the most generic standard is given. For example, if a requirement is stated in both the [UDF] and [DVD] standard, the reference to the [UDF] standard is presented.

Shaded checks are not yet implemented. To implement these checks a lot of time is required, and these checks are not very interesting with respect to [DVD] file systems. The checks mostly concern parts of the [ECMA] standard which are not used by the [DVD] standard.

>>> [DVD] ERROR 5051 :
ERR_FSYS_FLAGS_NOT_NULL
Reserved flags shall be ZERO.

>>> [DVD] ERROR 5052 (ref. ECMA 3/8.4.4) :
ERR_FSYS_REMAINDER_NOT_NULL
All space after the end of the last descriptor up to the end of the logical sector shall be recorded as all #00 bytes.

>>> [DVD] ERROR 5053 :
ERR_FSYS_RESERVED_NOT_NULL
Reserved bytes not #00

>>> [DVD] ERROR 5054 :
ERR_FSYS_EXTENT_TOO_SMALL
Structure overflows extent.

>>> [DVD] ERROR 5055 :
ERR_FSYS_EXTENTS_OVERLAP
Sectors of extents shall not overlap.

>>> [DVD] ERROR 5060 (ref. ECMA 7.2, UDF 2.1.1) :
ERR_DSTRING_INVALID_CHAR
The characters must comply to the Unicode 1.1 specification.

>>> [DVD] ERROR 5061 (ref. ECMA 7.2, UDF 2.1.1) :

ERR_DSTRING_INVALID_COMPRESSIONID

Two compression algorithms are supported: the value of **CompressionID** must be either eight or sixteen.

This is checked by the parser.

>>> [DVD] ERROR 5062 (ref. ECMA 1/7.3) :

ERR_TIMESTAMP_OUT_OF_RANGE

Each of the fields must comply to the corresponding interval stated in ECMA 1/7.3:

- Year: 1..9999.
- Month: 1..12.
- Day: 1..31.
- Hour: 0..23.
- Minute: 0..59.
- Second: If the value of Type equals 2 than 0..60, otherwise 0..59.
- Centiseconds: 0..99.
- Hundreds Of Microseconds: 0..99.
- Microseconds: 0..99.

>>> [DVD] ERROR 5063 (ref. UDF 2.1.4.1, ECMA 1/7.3) :

ERR_TIMESTAMP_NOT_LOCAL_TIME

The type of the time stamp must equal the value one.

>>> [DVD] ERROR 5064 (ref. ECMA 1/7.4, UDF 2.1.5) :

ERR_REGID_IDENTIFIER_NOT_COMPLIANT

The value of the **identifier** must comply to the values specified in [UDF] 6.2, it must contain one of the byte sequences listed in the table.

>>> [DVD] ERROR 5065 (ref. UDF 6.3 and 2.1.5.3, ECMA 1/7.4) :

ERR_REGID_OS_NOT_RECOGNIZED

The values for the **OS class** and **OS identifier** must comply to the values specified in the table of section [UDF] 6.3.

>>> [DVD] ODDITY 5066 (ref. UDF 2.1.5.3, ECMA 1/7.4) :

ERR_REGID_UDF_REVISION

The value of the UDF revision in the Domain Identifier Suffix or the UDF Identifier Suffix must be 0x0102.

>>> [DVD] ODDITY 5067 (ref. UDF 6.3) :

ERR_REGID_IDENTIFIER_NOT_CONSISTENT

Regid implementation identifier shall be consistent with Primary Volume Descriptor implementation identifier.

>>> [DVD] ERROR 5068 (ref. UDF 2.1.3, ECMA 1/7.2.12) :

ERR_DSTRING_LENGTH_TOO_LARGE

For fixed length character fields of length n, the nth byte contains the length of the string. This value may not be longer than the maximum length of the character field.

>>> [DVD] ERROR 5069 (ref. UDF 2.1.3, ECMA 1/7.2.12) :

ERR_DSTRING_REMAINING_NOT_ZERO

If the character field length recorded in the last byte is zero, the other fields must contain the value 0x00. Also, remaining byte positions shall be set to zero.

>>> [DVD] ERROR 5070 (ref. UDF 2.1.2, ECMA 1/7.2) :

ERR_DSTRING_CHARACTER_SET

The value for the **CharacterSetType** must be 0 and the value for **CharacterSetInfo[63]** must equal the ASCII string “OSTA Compressed Unicode”.



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>>> [DVD] ERROR 5080 (ref. DVD-2 2.6.5 and 2.6.7, ECMA 1/7.4) :

ERR_REGID_NOT_PROTECTED

In case of DVD-2, the value of the flags (of the entity identifier) must be two. Furthermore, the Hard Write-Protect flag and the Soft Write-Protect flag must be set to one.

>>> [DVD] ERROR 5081 (ref. DVD-2 A.2, A.3) :

ERR_REGID_OS_DEFINED

OS class, identifier, should be 0

4.4.21.1.2 DVD Filesystem ECMA2 checks

>>> [DVD] ERROR 5151 (ref. ECMA 2/8.3.1) :

ERR_VRA_TERMINATOR

The descriptor following a TEA01 (Terminating Extended Area) sequence can only be a BEA01 (Beginning Extended Area) descriptor. Furthermore, a BEA01 descriptor may only follow a BEA01 descriptor or a TEA01 descriptor.

>>> [DVD] ERROR 5152 (ref. ECMA 2/8, 2/9, 3/9) :

ERR_VRA_TYPE_VERSION

The value of the structure type of all the descriptors which can be part of the volume recognition area, must be zero. Furthermore, the value of the structure version field of the BOOT2, BEA01, NSR02, and the TEA01 must be one.

>>> [DVD] ERROR 5153 (ref. ECMA 2/9.1.2) :

ERR_VRA_IDENTIFIER_UNKNOWN

Each descriptor which is part of the volume recognition area has a standard identifier. This identifier must comply to the values presented in the table of [ECMA] 1/9.1.2. These values are “BEA01”, “BOOT2”, “CD001”, “CDW02”, “NSR02”, and “TEA01”.

>>> [DVD] ERROR 5154 (ref. ECMA 2/9.4) :

ERR_VRA_BOOT_EXTENT

The Boot Extent Location and the Boot Extent Length of a boot descriptor need to fit into a volume. However, if the erase flag is set, other boot descriptors may override the descriptor.

4.4.21.1.3 DVD Filesystem ECMA3 checks

>>> [DVD] ERROR 5155 (ref. ECMA 3/3.1) :

ERR_VRA_NSR02_NOT_FOUND

The NSR02 descriptor is not recorded.

>>> [DVD] ERROR 5160 (ref. DVD-2 A.11) :

ERR_VRA_BOOT_DESCRIPTOR

No BOOT descriptor allowed in DVD-2.

>>> [DVD] ERROR 5201 (ref. UDF 2.2.1.2) :

ERR_FSYS_DESCRIPTOR_LENGTH_INCORRECT

Descriptor length is incorrect.

>>> [DVD] ERROR 5202 (ref. ECMA 3/10.5.8) :

ERR_EXTENT_AD_OUT_OF_RANGE

The partition (the combination of position and length) does not fit in the volume.

>>> [DVD] ERROR 5203 (ref. ECMA 3/7.1.1) :

ERR_EXTENT_AD_LENGTH_NOT_MULTIPLE

The extent length of an extent descriptor must be a multiple of the sector size.

>>> [DVD] ERROR 5204 (ref. ECMA 3/7.2.1, 4/7.2.1) :

ERR_TAG_IDENTIFIER_UNKNOWN

The value of the identifier of a tag (of a descriptor) must be in the interval [1..9] for [ECMA] 3/7.2. or in the interval [256.. 265] for [ECMA] 4/7.2.

>>> [DVD] ERROR 5205 (ref. ECMA 3/7.2.2, 4/7.2.1) :

ERR_TAG_VERSION_NOT_TWO

The Descriptor Version must be two.

>>> [DVD] ERROR 5206 (ref. ECMA 3/7.2.3, 4/7.2.1) :

ERR_TAG_CHECKSUM

The Tag Checksum of the tag must be equal to the sum of all the bytes comprising the tag with the exception of the Tag Checksum.

>>> [DVD] ERROR 5207 (ref. ECMA 3/7.2.6, 4/7.2.1) :

ERR_TAG_CRC

The Descriptor CRC of the tag contains the remainder of a CRC calculation. The CRC calculation is performed over a sequence of bytes of length Descriptor CRC Length starting at the first byte after the tag.

>>> [DVD] ERROR 5208 (ref. ECMA 3/7.2.8, 4/7.2.1) :

ERR_TAG_LOCATION

The value of the Tag Location must equal the logical sector containing the first byte of the descriptor.

>>> [DVD] ERROR 5209 (ref. DVD-2 1.5.6, ECMA 3/7.2.5) :

ERR_TAG_SERIAL_NUMBER

The Tag Serial Number must be equal to zero.

>>> [DVD] ERROR 5210 (ref. UDF 2.3, ECMA 3/8.4.2) :

ERR_VDS_NPREVAILING

According to UDF 2, the following requirements exists:

- The number of prevailing PVDs must be one.
- The number of prevailing partition descriptors must be at most two.
- The number of LVDs must be exactly one.
- The number of prevailing USDs must be one.
- The number of prevailing LVIDs must be at least one.

According to [DVD 2.3], the number of prevailing partition descriptors must be one.

>>> [DVD] ERROR 5211 (ref. ECMA 3/8.4.1) :

ERR_VDS_DESCRIPTOR_NOT_IDENTICAL

Every two descriptors which have the same Volume Descriptor Sequence Number in a volume descriptor sequence, must be equal.

>>> [DVD] ERROR 5212 (ref. ECMA 3/8.3, 3/8.4.2) :

ERR_VDS_DESCRIPTOR_TYPE_INVALID

Descriptor tag identifier is not in {1,3,4,5,6,7,8}

>>> [DVD] ERROR 5213 (ref. DVD-2 2.3, UDF 2 and ECMA 3/8.4.2.1) :

ERR_ANCHOR_POINTS_NOT_TWO

According to [UDF] 2, the number of recorded AVDP must be exactly two. They must be placed at two of the following three places: logical sector number 256, N-256, or N, where N is the last addressable sector of a volume.

According to [DVD] 2.3, the AVDP must be recorded at 256 and N, where N is again the last logical sector number.



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>>> [DVD] ERROR 5214 (ref. UDF 2, 2.2.3 ECMA 3/10.2) :

ERR_ANCHOR_NO_RESERVE

An AVDP must have a reserve VDS.

>>> [DVD] ERROR 5215 (ref. UDF 2.2.3.1, ECMA 3/10.2) :

ERR_ANCHOR_EXTENTS_TOO_SMALL

The extents identified by an AVDP must be at least 16 logical sectors in size.

>>> [DVD] ERROR 5216 (ref. ECMA 3/8.4.2, 8.4.2.3) :

ERR_VDS_NOT_EQUIVALENT

The main and reserve VDS must be equivalent. This means that they must specify equivalent sets of volume descriptors. The canonical forms must be the same.

>>> [DVD] ERROR 5217 (ref. DVD-2 2.1.7, ECMA 3/8.4.2) :

ERR_VDS_NO_TERMINATOR

According to [DVD] 2.1 (item 7), a terminating descriptor must be used to terminate the VDS.

>>> [DVD] ERROR 5220 (ref. ECMA 3/8.6, 10.1.6) :

ERR_PVD_VOLUME_SEQUENCE_NUMBER

The Volume Sequence Numbers of prevailing PVDs must be numbered in ascending order, starting at one.

>>> [DVD] ERROR 5221 (ref. ECMA 3/8.8.2, 10.10.3, UDF 2) :

ERR_LVID_NOT_CLOSED

The prevailing LVID must be closed, the value of IntegrityType must be one.

>>> [DVD] ERROR 5222 (ref. DVD-2 2.1.7 ECMA 3/8.8.2) :

ERR_LVIS_NO_TERMINATOR

In case of DVD-2 ([DVD] 2.1, item 7), a LVIS must be terminated by a Terminating Descriptor.

>>> [DVD] ERROR 5223 (ref. DVD-2 2.1.8. ECMA 3/8.8.2) :

ERR_LVIS_OPEN_DESCRIPTOR

In case of DVD-2 ([DVD] 2.1, item 8), a LVIS may not contain any Open Logical Volume Integrity Descriptors.

>>> [DVD] ERROR 5225 (ref. ECMA 3/10.1.7, 10.1.8, UDF 2.2.2.1) :

ERR_PVD_INTERCHANGE_LEVEL

Both the Interchange Level and the Maximum Interchange Level must be one. Only one PVD will exist.

>>> [DVD] ERROR 5226 (ref. ECMA 3/10.1.9, 10.1.10, 1/7.2.11, UDF 2.2.2.3 2.2.4) :

ERR_PVD_CSL

Both the Character Set List and the Maximum Character Set List must be one.

>>> [DVD] ERROR 5227 (ref. UDF 2.2.2.5 ECMA 3/10.1.11) :

ERR_PVD_VSI

The first 8 characters must form the CS0 hexadecimal representation of a 32-bit value.

This check is not yet implemented.

>>> [DVD] ERROR 5228 (ref. ECMA 3/10.1.20) :

ERR_PVD_PREDECESSOR

For every PVD, the Predecessor Volume Descriptor Sequence Location refers to the previous extent.

>>> [DVD] ERROR 5229 (ref. ECMA 3/10.1.21) :

ERR_PVD_FLAGS

The Flags of the PVD must be equal to one, only one PVD will exist.

>>> [DVD] ERROR 5231 (ref. UDF 2.2.4, 2.2.7.2.2 ECMA 3/10.4) :
 ERR_IUVD_IDENTIFIER_NOT_CONSISTENT

The LogicalVolumeIdentifier of the Implementation Use Volume Descriptor with Implementation Identifier “*UDF LV Info” must be identical to the LogicalVolumeIdentifier of the Logical Volume Descriptor.

>>> [DVD] ERROR 5232 (ref. UDF 2.2.7.2.2 ECMA 3/10.4) :
 ERR_IUVD_NOT_FOUND [ECMA] 3/10.4, [UDF] 2.2.7.2.2

An Implementation Use Volume Descriptor must exist with Implementation Identifier “*UDF LV Info”.

>>> [DVD] ERROR 5235 (ref. DVD-2 2.6.5 ECMA 3/10.5.3, UDF 1.2) :
 ERR_PD_CONTENTS

The Partition Contents must be equal to “+NSR02”.

>>> [DVD] ERROR 5236 (ref. ECMA 3/10.5.7, UDF 2, DVD-2 2.6.4) :
 ERR_PD_ACCESS_TYPE

The Access Type of a PD must be smaller than four.

>>> [DVD] ERROR 5237 (ref. DVD-2 2.1 9. 10. ECMA 3/10.5.6) :
 ERR_PD_CONTENTS_USE [ECMA 3/10.5.6, DVD 2.1]

In case of DVD-2 ([DVD 2.1], items 9 and 10), the Unallocated Space Table, Unallocated Space Bitmap, Freed Space Table, or Freed Space Bitmap may not be recorded.

>>> [DVD] ERROR 5238 (ref. DVD-2 2.1 3.) :
 ERR_PD_NUMBER

In case of DVD-2 ([DVD] 2.1, item 3), the Partition Number must be zero.

>>> [DVD] ERROR 5239 (ref. ECMA 3/10.5.3) :
 ERR_PD_NO_VOLUME_SPACE_ALLOCATED

The Partition Flags must indicate that a volume space is allocated.

>>> [DVD] ERROR 5240 (ref. UDF 2.2.4.2 ECMA 3/10.6) :
 ERR_LVD_BLOCK_SIZE

The Logical Block Size must be equal to the Logical Sector Size.

>>> [DVD] ERROR 5241 (ref. DVD-2 2.6.7, UDF 2, OR ECMA 3/10.6.8, 10.6.9. 10.7.3) :
 ERR_LVD_MT_L_N_PM

According to [UDF], the Map Table Length shall not be less than the number of **Partition Maps** times six. Only type one Partition Maps are used, these are six bytes long.

According to [DVD], the Map Table Length is exactly six. For [DVD], only one partition exists.

>>> [DVD] ERROR 5245 (ref. DVD-2 2.6.8, CMA 3/10.7.3 UDF 2.2.4.6) :
 ERR_PM_FIELDS

The Partition Map Type of a Logical Volume Descriptor must be one and the Partition Map Length must be six. In case of DVD-ROM, the Volume Sequence Number must be one.

>>> [DVD] ERROR 5246 (ref. ECMA 3/10.7.3.4) :
 ERR_PM_MISMATCH

There must be a **Partition Descriptor** which has the same value for the **partition number**. Every partition map must be referred to by a **Partition Descriptor**.

This check is not yet implemented.

>>> [DVD] ERROR 5250 (ref. DVD-2 2.6.9, ECMA 3/10.8



ERR_USD_FREE_SPACE

The value of Number of Allocation Descriptors of an **Unallocated Space Entry** must be zero.

>>> [DVD] ERROR 5255 (ref. ECMA 10.10.6) :

ERR_LVID_NPARTITIONS_INCONSISTENT

The **Number of Partitions** of a **LVID** must be equal to the number of partitions in a **LVD**.

This check is not yet implemented.

>>> [DVD] ERROR 5256 (ref. ECMA 10.10.8, 10.10.9) :

ERR_LVID_SIZES_INCONSISTENT

The values **Free Space Table** and **Size Table** of the **LVID** must be consistent. These two sets of values need to be consistent with the partition descriptors.

This check is not yet implemented.

>>> [DVD] ERROR 5257 (ref. ECMA 3/10.10.8)

ERR_LVID_INCONSISTENT

The number of files and/or the number of directories is not consistent with the number of entries in the file set of part 4.

This check is not yet implemented.

4.4.21.1.4 DVD Filesystem ECMA4 checks

>>> [DVD] ERROR 5301 (ref. ECMA 4/7.1) :

ERR_LB_ADD_OUT_OF_RANGE

The **Partition Reference Number** of a **lb_addr** must be smaller than the number of partitions in the **LVID**. Furthermore, the **Logical Block Number** must be smaller than the number of logical blocks in the partition.

A mapping from partition to the number of blocks in that partition is maintained. This mapping is used to verify the validity of the address.

>>> [DVD] ERROR 5304 (ref. ECMA 4/8.3.1) :

ERR_FILE_SET_DESCRIPTOR_DIFFER

Any two prevailing instances of a **File Set Descriptor** may not specify the same file set identification.

>>> [DVD] ERROR 5305 (ref. ECMA 4/8.3.1) :

ERR_FILE_SET_NO_NUMBER_ZERO

One of the **File Set Descriptors** must have the value zero for its **File Set Number**.

>>> [DVD] ERROR 5306 (ref. ECMA 4/8.3.1) :

ERR_FILE_SET_DOUBLE_IDENTIFICATION

All File Set Descriptors with identical File Set Descriptor Numbers must be identical.

An event is generated when a sequence of FSD has been parsed. Checks like this one over more than one FSD can be performed.

>>> [DVD] ERROR 5307 (ref. UDF 2.3.2 ECMA 4/8.3.1)

ERR_FILE_SET_DOMAIN_FLAGS

The **flags** of a **File Set Descriptor** must be set so it supports CSO character sets [UDF 2.1.2].

>>> [DVD] ERROR 5308 (ref. UDF 3.3 ECMA 4/8.3.1)

ERR_FILE_SET_MULTIPLE_DESCRIPTORS

The number of File Set Descriptors in a File Set Descriptor Sequence must be precisely one.

>>> [DVD] ERROR 5309 (ref. DVD-2 3.3 ECMA 4/8.3.1)

ERR_FILE_SET_NO_TERMINATOR

A File Set Descriptor Sequence must have a single Terminator Descriptor.

>>> [DVD] ERROR 5310 (ref. ECMA 4/14.1.10) :
ERR_FILE_SET_IDENTIFIER_NOT_CONSISTENT

The LogicalVolumeIdentifier of the File Set must be identical to the LogicalVolumeIdentifier of the Logical Volume Descriptor.

>>> [DVD] ERROR 5315 (ref. ECMA 4/8.6) :
ERR_FID_DOUBLE_IDENTIFIER

Every two File Identifier Descriptors must have a different File Identifier.

>>> [DVD] ERROR 5316 (ref. UDF 2.3.4.1 ECMA 4/8.6)
ERR_FID_FILE_VERSION_NUMBER

The FileVersionNumber of a File Identifier Descriptor must be one.

>>> [DVD] ERROR 5317 (ref. ECMA 4/8.6) :
ERR_FID_DOUBLE_PARENT

The number of File Identifier Descriptors describing the parent must be one.

>>> [DVD] ERROR 5318 (ref. ECMA 4/8.6) :
ERR_FID_CSI

A File Entry specifying a file in which a directory is recorded shall not specify a Character Set Information Extended Attribute.

>>> [DVD] ERROR 5320 (ref. ECMA 4/8.7) :
ERR_FE_DATA_IN_DESCRIPTOR

The parser is not able to handle the data of a user file if it is recorded in the File Entry itself.

>>> [DVD] ERROR 5321 (ref. ECMA 4/8.10):
ERR_NUMBER_DE_INCORRECT

The number of ICB entries overflow the ICB extent.

>>> [DVD] ERROR 5325 (ref. UDF 2.3.2.1 ECMA 4/1.4.1) :
ERR_FSD_INTERCHANGE_LEVEL

Both the Interchange Level and the Maximum Interchange Level of a File Set Descriptor must be three.

>>> [DVD] ERROR 5326 (ref. UDF 2.3.2.3, ECMA 4/14.1) :
ERR_FSD_CSL

Both the Character Set List and the Maximum Character Set List of a File Set Descriptor must be one.

>>> [DVD] ERROR 5327 (ref.DVD-2 1.5.6, UDF 2.3.1.1, ECMA 3/7.2.5) :
ERR_FSD_TAG_SERIAL_NUMBER

The Tag Serial Number must be equal to zero.

>>> [DVD] ERROR 5328 (ref. DVD-2 3.3.1) :
ERR_FSD_FILE_SET_NUMBER

The File Set Number must be equal to zero.

>>> [DVD] ERROR 5332 (ref. ECMA 4/14.4) :
ERR_FID_L_IU

The length of the Implementation Use of a FID must be a multiple of four. Furthermore, it must be large enough to contain a regid.

>>> [DVD] ERROR 5335 (ref. ECMA 4/14.6) :
ERR_AED_PREVIOUS

Each Allocation Extent Descriptor in a sequence holds the location of its successor, except the head of the sequence.



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>>> [DVD] ERROR 5341 (ref. UDF, DVD-2 A.8, UDF 2.4.5.1, ECMA 4/1.6.2) :
ERR_ICB_TAG_STRATEGY_TYPE

There are only two allowed strategies for an ICB: the value of Strategy Type must be either 4 or 4096.

>>> [DVD] ERROR 5342 (ref. UDF 6.6, DVD-2 A.8, ECMA 4/14.6.3) :
ERR_ICB_TAG_STRATEGY_PARAMETER

When the value of Strategy Type of an ICB tag is 4096, the value of the Strategy Parameter must be one.

>>> [DVD] ERROR 5343 (ref. UDF 6.6, ECMA 4/14.6.4) :
ERR_ICB_TAG_MAXIMUM_ENTRIES

When the value of Strategy Type of an ICB tag is 4096, the value of the Maximum Number of Entries must be two. Furthermore, there may not be more entries recorded in an ICB than the Maximum Number of Entries.

>>> [DVD] ERROR 5344 (ref. ECMA 4/14.6.8) :
ERR_ICB_TAG_FILE_TYPE

The value of File Type of an ICB tag must be smaller than 13.

>>> [DVD] ERROR 5345 (ref. ECMA 4/14.6.4) :
ERR_ICB_TAG_PARENT_ICB

Each member of a sequence of IBC's contains a reference to its predecessor (except the head of the sequence).

>>> [DVD] ERROR 5346 (ref. DVD-2 A.9, UDF 2.3.5.4, ECMA 4/14.6.4) :
ERR_ICB_TAG_FLAGS

The Flags, of the ICB tag, Sorted (Bit 4), Transformed (BIT 11), and Multi-versions (BIT12) must be equal to zero.

>>> [DVD] ERROR 5348 (ref. ECMA 4/14.9) :
ERR_FE_FILE_LINK_COUNT

The number of FID identifying the ICB which refers to the File Entry must be equal to the value of File Link Count of that File Entry.

>>> [DVD] ERROR 5349 (ref. UDF 2.3.7.0-3, ECMA 4/14.9.2) :
ERR_FE_RECORD

The values for RecordFormat, RecordDisplayAttributes, and RecordLength of a File Entry must be equal to zero.

>>> [DVD] ERROR 5350 (ref. ECMA 4/14.9.10) :
ERR_FE_INFORMATION_LENGTH

The value of the Information Length of the FE must be equal to the sum of the Information Lengths of the Allocation Descriptors.

>>> [DVD] ERROR 5351 (ref. ECMA 4/14.9.11, 12.1) :
ERR_FE_LOGICAL_BLOCKS

The value of Logical Blocks Recorded must be equal to the sum of the blocks in the recorded Allocation Descriptors.

>>> [DVD] ERROR 5352 (ref. ECMA 4/14.9.12) :
ERR_FE_DATE_AND_TIME

The Access, Modification, or Attribute Data and Time of the FE must be as least the File Creation Date and Time specified in the File Times Extended Attribute.

>>> [DVD] ERROR 5353 (ref. DVD-2 3.5.1, ECMA 4/14.9.15) :
ERR_FE_CHECKPOINT

The value of Checkpoint of a FE must be at least one.

>>> [DVD] ERROR 5354 (ref. ECMA 4/14.9.18) :

ERR_FE_ENTRIES_NOT_IDENTICAL

All FE with the same Unique Id must specify the same file.

>>> [DVD] ERROR 5355 (ref. UDF 3.3.3.4, ECMA 4/14.9.18) :

ERR_FE_UNIQUE_ID

The value of the Unique Id of a FE must be zero if the FE identifies the root directory. Furthermore, the value of the Unique Id may not be an element of {1..15}.

>>> [DVD] ERROR 5356 (ref. ECMA 4/14.9.19) :

ERR_FE_ATTRIBUTE_LENGTH

The value of Length of Extended Attributes must be an integral multiple of 4.

>>> [DVD] ERROR 5357 (ref. ECMA 4/14.9.22) :

ERR_FE_EXTENT_LOCATION

Any unrecorded or unallocated allocation descriptor must have its Extent Location set to zero.

>>> [DVD] ERROR 5358 (ref. DVD-2 3.5.1, A.7, ECMA 4/14.9.22) :

ERR_FE_NDESCRIPTORS

In case of [DVD], only short allocation descriptors may be used.

>>> [DVD] ERROR 5359 (ref. DVD-2 3.5.4, ECMA 4/14.9.22) :

ERR_FE_PERMISSIONS

The Permissions field of a FE must comply to the requirements presented in the table of [DVD 3.5.4].

>>> [DVD] ERROR 5360 (ref. ECMA 4/14.10.1) :

ERR_EA_LOCATION

The following requirements exist with respect to the attributes of the Extended Attribute Header descriptor:

- 24 <= Implementation Attributes Location
- Implementation Attributes Location <= Application Attributes Location
- Application Attributes Location <= Length of Extended Attributes (of the FE)

>>> [DVD] ERROR 5361 (ref. DVD-2 3.6, UDF 3.3.4, ECMA 4/14.10.1, UDF 3.3.4) :

ERR_EA_ATTRIBUTE_TYPE

In the first area of the extended attributes, attributes with values for the Attribute Type 1, 5, 6, and 12 are allowed. In the second area (Implementation Attributes), attributes with values for the Attribute Type within the range [2048..65535] are allowed. In the third area (Application Attributes), attributes with values for the Attribute Type starting at 65536 are allowed.

>>> [DVD] ERROR 5362 (ref. ECMA 4/14.10.1) :

ERR_EA_ATTRIBUTE_SUBTYPE

If the type of the extended attribute is part of {1, 3, 5, 6, 12, 2048, 65536}, the value of the Attribute Subtype must be one.

>>> [DVD] ERROR 5363 (ref. ECMA 4/14.10) :

ERR_EA_ATTRIBUTE_LENGTH

The value of Attribute Length of each attribute must correspond to the actual length of the attribute.

>>> [DVD] ERROR 5364 (ref. UDF 3.3.4.5.1) :

ERR_EA_HEADER_CHECKSUM

Header checksum error.

>>> [DVD] ERROR 5365 (ref. DVD-ROM 3.6) :

ERR_EA_ATTRIBUTE_NOT_FOUND

Extended Attribute ‘attribute string’ not found



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>>> [DVD] ERROR 5366 (ref. DVD Table 3.6.4-2) :

ERR_EA_CGMS_INFORMATION

CMGS Information field is false.

>>> [DVD] ERROR 5367 (ref. DVD-2 3.6.4) :

ERR_EA_CGMS_TYPE

CMGS Data Structure Type should be '0'.

>>> [DVD] ERROR 5368 (ref. DVD-2 3.6.4) :

ERR_EA_CGMS_PROTECTION

CMGS Protection System Information is larger than '1'.

>>> [DVD] ERROR 5370 (ref. ECMA 4/14.14.1.2):

ERR_AD_OUT_OF_RANGE

When the value of Extent Length is equal to zero, the Extent Position must also be equal to zero.

Analogous for [ECMA] 4/14.14.2.2.

>>> [DVD] ERROR 5370 (ref. ECMA 4/14.16.1.1):

ERR_AD_WRONG_TYPE

AD Type describes the wrong type.

>>> [DVD] ERROR 5375 (ref. ECMA 4/14.16.1.1) :

ERR_PATHNAME_TYPE

The value of Component Type of a Path Component must be larger than zero and smaller than six.

>>> [DVD] ERROR 5376 (ref. ECMA 4/14.16.1.2) :

ERR_PATHNAME_LENGTH

If the value of Component Type of the Path Component does not equal zero or five, the value of Length of Component Identifier must be zero. If the value of Component Type equals five, the value of Length of Component Identifier must be larger than zero.

>>> [DVD] ERROR 5377 (ref. ECMA 4/14.16.1.3) :

ERR_PATHNAME_VERSION

The value of Component File Version Number of a Path Component must be smaller than 32,768.

4.4.21.2 ISO 9660 File System Checks

>>> [DVD] ERROR 5501 :

ERR_ISO_RESERVED_NOT_NULL

Reserved bytes must be all NULL bytes. This also holds for unused and padding fields. Because this requirement occurs more than once in the standard, no specific reference is given.

>>> [DVD] ERROR 5502 (ref. ISO 6.1.2) :

ERR_ISO_LOGICAL_SECTOR_SIZE

The Logical Sector Size must be 2048×2^n , where n is an integer which is at least zero ([ISO] 6.1.2).

This can not be verified. The descriptors which form the ISO file system do not contain information about the logical sector size.

>>> [DVD] ERROR 5503 (ref. ISO 6.2.2) :

ERR_ISO_LOGICAL_BLOCK_SIZE

The Logical Block Size must comply to two requirements:

1. The Logical Block Size must be 512×2^n , where n is an integer which is at least zero.
2. The Logical Block Size may not be larger than the logical sector size ([ISO] 6.2.2).

>>> [DVD] ERROR 5504 (ref. ISO 6.2.2) :

ERR_ISO_LBS_INCONSISTENT

The Logical Block Size is recorded in every PVD/SVD of the VRA. These recorded values must be the same ([ISO] 6.2.2).

>>> [DVD] ERROR 5505 (ref. ISO 6.7.1.1) :

ERR_ISO_NO_PVD

At least one Primary Volume Descriptor must be defined in the VRA ([ISO] 6.7.1.1).

>>> [DVD] ERROR 5506 (ref. ISO 6.7.1.5) :

ERR_ISO_NO_VDST

The sequence of descriptors in the VRA must be terminated by at least one Volume Descriptor Set Terminator ([ISO] 6.7.1.5).

>>> [DVD] ERROR 5507 (ref. ISO 6.8.1.3) :

ERR_ISO_DIR_LENGTH

The Data Length of a Directory Record must be a multiple of the Logical Block Size ([ISO] 6.8.1.3).

>>> [DVD] ERROR 5508 (ref. ISO 6.8.2.1) :

ERR_ISO_PATH_LENGTH

The total length of a File Identifier and the Directory Identifiers and the number of directories (this is the entire path of a file) may not exceed 255 characters. ([ISO] 6.8.2.1).

This is analogous verified as the possible error described in section 0.

>>> [DVD] ERROR 5509 (ref. ISO 6.8.2.1) :

ERR_ISO_DIR_LEVELS

The number of levels of a directory may not exceed eight ([ISO] 6.8.2.1).

>>> [DVD] ERROR 5510 (ref. ISO 6.8.2.2) :

ERR_ISO_DIR_DR

The Directory Records in a directory have to meet the following requirements (ISO 6.8.2.2):

1. At least two DR must be defined.
2. The first DR of the directory shall describe the directory itself and shall have a Directory Identifier consisting of a single '0'h byte.
3. The second DR of the directory shall describe the parent directory and shall have a Directory Identifier consisting of a single '1'h byte. If the root directory is evaluated, it shall also describe the directory itself.

>>> [DVD] ERROR 5511 (ref. ISO 7.6) :

ERR_ISO_DIRECTORY_IDENTIFIER

A Directory Identifier contains an error.

>>> [DVD] ERROR 5512 (ref. ISO 7.3) :

ERR_ISO_BOTH_BYTE_ORDER

When a 16 or 32 bit numerical value is recorded both LB and MB, the two recorded values must be equal ([ISO] 7.3).

>>> [DVD] ERROR 5513 (ref. ISO 7.3, Annex A) :

ERR_ISO_D_CHARACTERS

A sequence of d-characters must comply to the ISO standard 646 (this standard is part of [ISO], Annex A). The numerical value of each character must be a part of the collection: {'30h'..'39h', '41h'..'5Ah', '5Fh'} ([ISO] 7.3).

>>> [DVD] ERROR 5514 (ref. ISO 7.3, Annex A) :



ERR_ISO_A_CHARACTERS

A sequence of a-characters must comply to the ISO standard 646 (this standard is part of [ISO], Annex A). The numerical value of each character must be a part of the collection: {‘20h’..‘22h’, ‘25h’..‘2Fh’, ‘30h’..‘3Fh’, ‘41h’..‘5Ah’, ‘5Fh’} ([ISO] 7.3).

>>> [DVD] ERROR 5515 (ref. ISO 8.4.20-8.4.22, 8.5.13-8.5.15) :
ERR_ISO_FILE_NOT_FOUND

When a PVD or SVD defines a file for the Publisher Identifier, Data Preparer Identifier, or the Application Identifier, this file must be located in the root directory to which the PVD/SVD refers ([ISO] 8.4.20-8.4.22 and 8.5.13-8.5.15).

>>> [DVD] ERROR 5516 (ref. ISO 8.1.1) :
ERR_ISO_DESCRIPTOR_TYPE

The value of Volume Descriptor Type must be part of the collection {0..3, 255} ([ISO] 8.1.1).

>>> [DVD] ERROR 5517 (ref. ISO 8.1.3) :
ERR_ISO_DESCRIPTOR_VERSION

The value of the Volume Descriptor Version must be 1 ([ISO] 8.1.3). Given all the possible descriptors of the [ISO] standard, the value of the VDV must be 1.

>>> [DVD] ERROR 5518 (ref. ISO 8.4.26.1 Table 5) :
ERR_ISO_DATE_TIME

The structure defined in table 5 of ([ISO] 8.4.26.1) must comply to:

- The string year must represent a value which is part of 1..9999.
- The string month must represent a value which is part of 1..12.
- The string day must represent a value which is part of 1..31.
- The string minute must represent a value which is part of 0..59.
- The string second must represent a value which is part of 0..59.
- The sting Hundredths of a second must represent a value which is part of 0..99.
- The string Offset must represent a value which is part of -48..52.

4.4.21.2.1 Boot Record

There is not much to verify about the Boot Record. The common VRA descriptor fields must be verified. Furthermore, the two attributes Boot System Identifier and Boot Identifier containing a-characters must be verified.

4.4.21.2.2 Primary Volume Descriptor

This sections lists the verification for a PVD.

>>> [DVD] ERROR 5519 (ref. DVD-2 A.13) :
ERR_ISO_SYSTEM_IDENTIFIER

The System Identifier of the PVD must be set to all ‘20’h bytes due to a DVD-Video requirement ([DVD-2] A.13).

>>> [DVD] ERROR 5521 (ref. ISO 8.4.20-8.4.22 and 8.5.13-8.5.15) :
ERR_ISO_FILE_NAME

If the first byte of the Publishers Identifier, Data Preparer Identifier, or Application Identifier is ‘5F’h, this field shall specify a file described with at most eight d-characters as a File Name and at most three d-characters as a File Name Extension ([ISO] 8.4.20-8.4.22 and 8.5.13-8.5.15).

>>> [DVD] ERROR 5522 (ref. ISO 7.6) :

ERR_ISO_FILE_IDENTIFIER

A File Identifier contains an error.

>>> [DVD] ERROR 5523 (ref. ISO 8.4.30) :

ERR_ISO_FSV

The value of the attribute File Structure Version must be 1 ([ISO] 8.4.30).

4.4.21.2.3 Supplementary Volume Descriptor

The requirements with respect to the SVD are analogous to the PVD. However, an additional requirement exists.

>>> [DVD] ERROR 5524 (ref. ISO 8.5.3) :

ERR_ISO_VOLUME_FLAGS

The bits one through seven of the Volume Flags must be zero ([ISO] 8.5.3).

4.4.21.2.4 Directory Record

This section describes the required verification with respect to the Directory Record.

>>> [DVD] ERROR 5525 (ref. DVD-2 A.14) :

ERR_ISO_DR_EARL

The Extended Attribute Record Length must be set to zero due to DVD-Video ([DVD-2] A.14).

>>> [DVD] ERROR 5526 (ref. ISO 9.1.5) :

ERR_ISO_DR_RDT

The following requirements have to be met due to [ISO] 9.1.5.

- The value of Month must be part of 1..12
- The value of Day must be part of 1..31
- The value of Hour must be part of 0..23
- The value of Minute must be part of 0..59
- The value of Second must be part of 0..59
- The value of Offset must be part of {-48, 52}

>>> [DVD] ERROR 5527 (ref. ISO 9.1.6) :

ERR_ISO_DR_FILE_FLAGS

If the DR describes a directory (bit position 1 equals zero), the flags for Associated File, Record, and Multi-Extent must be set to zero (bit positions 2, 3, and 7).

If no Extended Attribute Record is defined, the Record flag (bit position 3) and the Protection flag (bit position 4) must be set to zero. Due to [DVD-2], no extended attributes are allowed. Therefore, the Record (bit position 3) and Protection flag (bit position 4) must be set to zero.

The reserved flags (bit positions 5 and 6) must be set to zero.

These requirements are due to [ISO] 9.1.6.

>>> [DVD] ERROR 5528 (ref. DVD-2 A.14) :

ERR_ISO_DR_FUS

The File Unit Size must be set to zero due to DVD-Video ([DVD-2] A.14).

>>> [DVD] ERROR 5529 (ref. DVD-2 A.14) :



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ERR_ISO_DR_IGS

The Interleave Gap Size must be set to zero due to DVD-Video ([DVD-2] A.14).

>>> [DVD] ERROR 5530 (ref. DVD-2 A.14) :

ERR_ISO_DR_SU

The System Use field must be six bytes long and must contain the Copyright Management Information ([DVD-2] A.14). Since the Copyright Management Information is six bytes, nothing else may be defined in the System Use field.

>>> [DVD] ERROR 5531 (ref. DVD-2 3.7.2) :

ERR_ISO_CMI_SUF

The Copyright Management Information of the system use field must meet the following requirements ([DVD-2] 3.7.2):

- The reserved bits of the CGMS Information field must be set to zero.
- The value of Data Structure Type of the CGMS must be set to zero.
- The Protection System Type of the Protection System Information must be either set to zero or one.
- The reserved bytes of the Protection System Information must be set to zero.

>>> [DVD] ERROR 5532 (ref. ISO 9.2) :

ERR_ISO_DIR_INCONSISTENT

The following attributes of each Directory Record must contain the same values if they refer to the same file ([ISO] 9.2):

- Existence, Directory, Associated, Record, and Reserved bits of the File Flags field.
- Padding Field

>>> [DVD] ERROR 5533 (ref. ISO 9.3) :

ERR_ISO_DIR_ORDER

The directories must be ordered according to the criteria listed below. The criteria with the lowest number have the highest priority ([ISO] 9.3).

1. Ascending with respect to the File Names.
2. Ascending with respect to the File Name Extensions.
3. Descending with respect to the File Version Numbers.
4. Descending with respect to the Associated File bit of the File Flags field.

4.4.21.2.5 Path Table Record

This section describes the verification which is required when a Path Table Record has been parsed. This verification does not include the consistency check of the VRA, Path Tables, and directories.

>>> [DVD] ERROR 5534 (ref. DVD-2 A.15) :

ERR_ISO_PTR_EARL

The Extended Attribute Record Length must be set to zero due to DVD-Video ([DVD-2] A.15).

>>> [DVD] ERROR 5535 (ref. ISO 8.4.13) :

ERR_ISO_PATH_TABLE_SIZE

The value of the Path Table Size must be equal to the sum of the sizes of all the Path Table Records in the path table ([ISO] 8.4.13).

>>> [DVD] ERROR 5536 (ref. ISO 6.8.2.2) :

ERR_ISO_DIR_LOCATION

The first DR must refer to the directory itself and the location of the directory, specified by this DR, must match the actual location of the directory ([ISO] 6.8.2.2).

>>> [DVD] ERROR 5537 (ref. ISO 6.8.2.2) :

ERR_ISO_DIR_PARENT

The second DR must refer to the parent and the by this DR specified location must match the actual location of the parent directory ([ISO] 6.8.2.2).

>>> [DVD] ERROR 5538 (ref. ISO 6.9) :

ERR_ISO_DR_PTR_INCONSISTENT

The PVDs and SVDs of the VRA contain references to the root directory, the type L Path Table, and the type M Path Table. These three items must be consistent. They must be consistent on the attributes Location of Extent, File Identifier, and the DR Number. Via the reference of the root directory an entire directory tree is parsed. The directories contained in this directory tree must all be listed in the path tables ([ISO] 6.9).

>>> [DVD] ERROR 5539 (ref. ISO 6.9) :

ERR_ISO_PTR_INCONSISTENT

When an entry in a path table describes a file, the entry must be consistent with the entry in the other path table which describes the same file.

4.4.22 DVD Xchecks

4.4.22.1 Strategy for getting correct Cell data

For a number of cross checks, Cell data is required from the PGCI tables. When a VOB is parsed, there is no direct way to retrieve this data, as Cells in a VOB do not map directly onto Cells in a PGC. The method for accessing the Cell data is described here.

The DSI.DSI_GI has the VOBU_VOB_IDN and VOBU_C_IDN encoded. These values identify the Cell in a VOB. The PGCI.C_POSIT contains the mapping from VOBU_VOB_IDN and VOBU_C_IDN to the Cell number in a PGC, which means that all PGCI from the VTSI must be scanned. This results in the PGC number and Cell number. The Cell data can be found in the PGCI.C_PBIT.

The way to access this data, using the xcheck methods is:

```
xcheck->C_IDN2Cell_number( xcheck, VOBU_C_IDN, VOBU_VOB_IDN);
```

This results in a Cell_list entry, that contains all information about the Cell from the PGCI data. From this Cell_list entry, all Cell attributes can be retrieved with the available xcheck methods.

4.4.22.2 General Cross Checks

>>> [DVD] SYSTEM ERROR 5601 (ref. DVD_xcheck) :

ERR_DVD_XCHECK_DISABLED

The cross check file could not be read! Make sure the 'dvd_verif_xdata.info' exists. This error is also reported when the file does exist, but the following cases occur:

- The requested data was not present in the file, eg. VTSI or VMGI data.
- The requested data is present, but is in a wrong format. This is probably due to an edited cross check file, or a version of the cross check file generated with another version of the verifier.

This will be reported as a system error.



>>> [DVD] INFORMATION 5602 (ref. DVD_xcheck) :

ERR_DVD_XCHECK2_DISABLED

An error occurred while trying to write to the cross check file. Cross checks will be disabled. This error is reported when the verifier can not create the cross check file. This can be due to:

- The verifier does not have write permission in the directory where the verifier was started, which will happen when verifying directly from a read-only device (e.g. DVD-ROM drive).
- Not enough space on the device was available to the verifier for the cross check file.
- Miscellaneous reasons why the file could not be written, such as malfunctioning device, device not found, etc.

This will be reported as a system error.

>>> [DVD] ERROR 5603 (ref. DVD-3 4.1.5.3) :

ERR_DVD_XCHECK_ILLEGAL

Cross Check for a field failed during comparison between values for identical fields in different files. This error is reported when verifying VMGI.VTS_ATRT values against the same data in the VTSI.VTSI_MAT BP 34-37 and BP 256-1023. All values should be equal.

>>> [DVD] ERROR 5604 (ref. DVD_xcheck) :

ERR_DVD_SCRIPT_XCHECK_CONFLICT

The parameters in the script-file should be equal to the corresponding fields from the cross check file. When an inconsistency is found, this is reported and the value from the script-file is used. This gives the user the possibility to override the cross check values in case these were found to be incorrect, or just for testing purposes. This is reported as an information message.

>>> [DVD] ERROR 5605 (ref. N/A) :

ERR_DVD_XCHECK_NO_CELL_REF

The current Cell is not referenced by a PGC in the VTS for the current domain and therefore cannot be played

The message reports that a VOB is present in the VOBS, but not used in the definition of the PGCs in the VTSI. This means that you cannot access the data in that VOB from the navigation data point of view. The data is not usable and therefore not really useful and thus a waste of diskspace. This message will be reported as an ODDITY.

4.4.22.3 VTSI Cross Checks

>>> [DVD] ERROR 5609 (ref. DVD_xcheck) :

ERR_DVD_XCHECK_ILL_PGCN

The PGCN is not specified in the VTSI, in the current domain.

>>> [DVD] ERROR 5610 (ref. DVD-3 4.2.5) :

ERR_DVD_XCHECK_TMAPT_ABSENT

No VTS_TMAPT found in VTSI, but it is mandatory if the VMGI.TT_SRP.TT_TY for the current title, equals 0, indicating a sequential PGC title.

>>> [DVD] ERROR 5611 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_VTSTTN_LARGE

VTS_TTN from VMGI is larger than the number of VTS_TTU_SRP from the VTSI.

>>> [DVD] ERROR 5612 (ref. DVD_xcheck) :

ERR_DVD_XCHECK_VTSN_LARGE

The current VTS number is not specified in the VMGI. All VTS's should be specified in the VMGI.

>>> [DVD] ERROR 5613 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_VTSN_ILL

VTS_TTN from the current VTS is not found in the VMGI.

>>> [DVD] ERROR 5614 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_PTTN_ILL

PTT_Ns from VMGI does not equal to number of PTT_SRP in the current Title from the current VTS.

>>> [DVD] ERROR 5615 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_PGCN_ILL

The PGCN from PTT_SRP must be assigned consecutively, starting from '1', when the Title_Type describes a One_Sequential_PGC_Title.

>>> [DVD] ERROR 5616 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_PGN_ILL

The PGN should be assigned consecutively for each PGCN, starting from '1', when the Title_Type describes a One_Sequential_PGC_Title.

>>> [DVD] ERROR 5617 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_PGN_NOT_ONE

The PGN for a new PGCN should be '1', when the Title_Type describes a One_Sequential_PGC_Title.

>>> [DVD] ERROR 5618 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_RANDOMPGCN_ILL

The PGCN may only specify one PGN, thus the PGCN must be '1' larger than the previous PGCN, when the Title_Type describes a One_Random_PGC_Title, which allows only 1 PGC entry per PTT.

>>> [DVD] ERROR 5619 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_RANDOMPGN_ILL

The PGCN may only specify one PGN, thus the PGN must always be '1', when the Title_Type describes a One_Random_PGC_Title, which allows only 1 PGC entry per PTT.

>>> [DVD] ERROR 5620 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_BLOCKPGCN_ILL

The PGCN from the PTT_SRP should specify the first PGC from a block.

>>> [DVD] ERROR 5625 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_PGN_LARGE

The PGN from the PTT_SRP is larger than the number of Programs specified in PGC 'PGC number' of the 'Domain string'.

>>> [DVD] ERROR 5626 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_PTTN_NOT_FOUND

The current Cell (C_IDN='cell id', VOB_IDN='VOB id') belongs to PG#'program number' of PGC#'PGC number', but this PG is not referred to by a PTT.

All Programs should be referred to by a PTT.

>>> [DVD] ERROR 5627 (ref. DVD-3 4.2.2) :

ERR_DVD_XCHECK_TT_NOT_FOUND

The current Cell (C_IDN='cell id', VOB_IDN='VOB id') belongs to PG#'program number' of PGC#'PGC number', refers to a PTT that is found in TTU#'Title unit number', which is not specified in the VMGI.

4.4.22.4 Navigation Commands Cross Checks

>>> [DVD] ERROR 5651 (ref. DVD-3 4.6.4.1) :

ERR_DVD_XCHECK_NAVCMD_NS_BIG

The Navigation command GoTo or SetTmpPML specified a Navigation command number larger than the number of Navigation commands specified in the current PGC.



>>> [DVD] ERROR 5652 (ref. DVD-3 4.6.4.2) :

ERR_DVD_XCHECK_ILL_DOMAIN

The Navigation command specified a destination which could not be found in the current Domain. This error is reported for these Navigation commands:

- LinkPGCN, when the specified PGC is not present in the VTS.
- LinkPGN, when the specified PG is not present in the VTS.

>>> [DVD] ERROR 5653 (ref. DVD-3 4.6.4.2/3) :

ERR_DVD_XCHECK_ILL_BLOCK_MODE

The Navigation command is part of a block, but the Block_mode of the command is not correctly set. This error is reported when:

- LinkPGCN specifies a PGC, but this PGC's Block_mode should be '01b' (the first PGC in the block).
- LinkCN specifies a Cell, but this Cell's Block_mode should be '01b' (the first Cell in the block).
- CallSS specifies a Cell for resume, but this Cell's Block_mode should be '01b' (the first Cell in the block).

>>> [DVD] ERROR 5654 (ref. DVD-3 4.6.4.2/3) :

ERR_DVD_XCHECK_MAX_PTTN

The number of the PTT specified in the Navigation command is not legal for the current Title. The PTT values should be <99 in a sequential Title, or <999 in a random or shuffle Title. This error is reported for the Navigation commands:

- LinkPTTN.
- JumpVTS_PTT.

>>> [DVD] ERROR 5655 (ref. DVD-3 4.6.4) :

ERR_DVD_XCHECK_ENTRY_NOTFOUND

The Navigation command specified a value, that could not be found in the VTS. This error is reported when:

- The LinkPTTN Navigation command specified a non-present VTS number.
- The LinkPTTN Navigation command specified a non-present PTT number.
- The LinkPGN Navigation command specified a non-present Program number.
- The LinkCN Navigation command specified a non-present Cell number.
- The JumpTT Navigation command specified a non-present Title number.
- The JumpVTS_TT Navigation command specified a non-present VTS_TT number.
- The JumpVTS_PTT Navigation command specified a non-present Title number.
- The JumpVTS_PTT Navigation command specified a non-present PTT number.
- The JumpSS Navigation command specified a non-present PGC number, in case of a jump to the VMGM Domain.
- The JumpSS Navigation command specified a non-present Title number, in case of a jump to the VTSM Domain.
- The CallSS Navigation command specified a non-present Title number, in case of a call to the VTSM Domain.
- The CallSS Navigation command specified a non-present PGC number, in case of a call to the VMGM Domain.
- The SetNVTMR Navigation command specified a non-present PGC number.

The LinkPTTN Navigation command specified a non-present PTT number

>>> [DVD] ERROR 5656 (ref. DVD-3 4.6.4.2 (e)) :

ERR_DVD_XCHECK_ONE_ENTRY

This error reports a Navigation command that is not able to be performed, because only one entry to which the Navigation command refers exists. This error is reported when:

- The Link_S_LinkNextC Navigation command specifies to link the next Cell, but only 1 Cell exists in the PGC.
- The Link_S_LinkNextPG Navigation command specifies to link the next program, but only 1 program exists in the PGC.

>>> [DVD] ERROR 5657 (ref. DVD-3 4.6.4.2 (e)) :

ERR_DVD_XCHECK_NOT_EXISTS

This error reports a Navigation command that is not able to be performed, because the entry to which the Navigation command refers does not exist. This error is reported when:

- The Link_S_LinkNextPGC Navigation command specifies to link the next Program Chain, but the NextPGC field from the current PGC (cf. [DVD-3] 4.3.2 (6)) equals '0', meaning no next PGC.
- The Link_S_LinkPrevPGC Navigation command specifies to link the previous Program Chain, but the PrevPGC field from the current PGC (cf. [DVD-3] 4.3.2 (6)) equals '0', meaning no previous PGC.

>>> [DVD] ERROR 5658 (ref. DVD-3 4.6.4.2 (e)) :

ERR_DVD_XCHECK_NO_GOUP_PGC

This error reports the Link_S_LinkGoUpPGC Navigation command is not able to be performed, because the GoUpPGC to which the Navigation command refers is illegal. This error is reported when the Navigation command specifies to link the GoUp Program Chain, but the GoUpPGC field from the current PGC (cf. [DVD-3] 4.3.2 (6)) equals '0', meaning no GoUp PGC.

>>> [DVD] ERROR 5659 (ref. DVD-3 4.6.4.2 (e)) :

ERR_DVD_XCHECK_GOUP_PGC_ILL

This error reports the Link_S_LinkGoUpPGC Navigation command is not able to be performed, because the GoUpPGC to which the Navigation command refers does not exist. This error is reported when the Navigation command specifies to link the GoUp Program Chain, but the PGC with the PGCN from the GoUpPGC field (cf. [DVD-3] 4.3.2 (6)) is not present in the current VTS.

>>> [DVD] ERROR 5660 (ref. DVD-3 4.6.4.3) :

ERR_DVD_XCHECK_NO_FP_PGCI

This error reports a Navigation command that is not able to be performed, because first play PGC does not exist. This error is reported when:

- The JumpSS Navigation command specifies a jump to the first play PGC (indicated by the Domain ID from the navigation command argument (cf. [DVD-3] 4.6.4.3 (e))), but no first play PGC exists in the current VTS.
- The CallSS Navigation command specifies a call to the first play PGC (indicated by the Domain ID from the navigation command argument (cf. [DVD-3] 4.6.4.3 (f))), but no first play PGC exists in the current VTS.

>>> [DVD] ERROR 5670 (ref. DVD-3 4.6.4.3) :

ERR_DVD_XCHECK_ENTRYPGC_NOTFOUND

This error reports a Navigation command that is not able to be performed, because the PGC to which the Navigation command refers is defined as an entry PGC. Only an entry PGC can be specified. This error is reported when:

- The JumpSS Navigation command specifies a Domain ID '00b' or '11b' (cf. [DVD-3] 4.6.4.3 (e)).
- The CallSS Navigation command specifies a Domain ID '00b' or '11b' (cf. [DVD-3] 4.6.4.3 (f)).



>>> [DVD] ERROR 5671 (ref. DVD-3 4.6.4.3) :

ERR_DVD_XCHECK_MENU_NOTFOUND

This error reports a Navigation command that is not able to be performed, because the Menu to which the Navigation command refers is not present in the current PGC. This error is reported when:

- The JumpSS Navigation command specifies a Domain ID '10b' (cf. [DVD-3] 4.6.4.3 (e)).
- The CallSS Navigation command specifies a Domain ID '01b' or '10b' (cf. [DVD-3] 4.6.4.3 (f)).

>>> [DVD] ERROR 5672 (ref. DVD-3 4.6.4.3 (f)) :

ERR_DVD_XCHECK_RESUME_ILL

This error reports the CallSS Navigation command is not able to be performed, because the Cell number for resume specified in the Navigation command is not present in the current PGC.

>>> [DVD] ERROR 5673 (ref. DVD-3 4.6.4.3 (f)) :

4.4.22.5 Audio Cross Checks

>>> [DVD] ERROR 5674 (ref. DVD-3 4.6.4.3) :
ERR_DVD_XCHECK_ENTRY_LARGE

The navigation command SetSYS_STN specified a value for one of the following fields that was larger than specified in the VMGI:

- ASTN, the number of the Audio stream.
- SPSTN, the number of the Sub-picture stream.
- AGLN, the number of Angles.

>>> [DVD] ERROR 5701 (ref. DVD-3 4.3.2-2) :
ERR_DVD_XCHECK_DEC_ASTN_NOT_FOUND

The Audio stream specified in the PGC (PGC_AST_CTLT) was not found in this VOB.

At the end of the VOBS, all audio streams that have the Availability_flag in the PGC_AST_CTL of the audio stream set to '1' will be checked against the audio streams that were present in the VOB. When audio streams should be available, but were not found, this error is generated.

>>> [DVD] ERROR 5702 (ref. DVD-3 4.3.2-2) :
ERR_DVD_XCHECK_ASTN_NOT_FOUND

An Audio stream was found in the VOB, but was not specified in the PGC (PGC_AST_CTLT).

When an audio frame header is encountered in the VOBS, the Availability_flag for that audio stream should be set to '1' in the PGC_AST_CTL of the audio stream. This error is generated when the Availability_flag is set to '0'.

>>> [DVD] ERROR 5703 (ref. DVD-3 4.1.1 BP 260 / 4.2.1 BP 260/516) :
ERR_DVD_XCHECK_RANDOM_ILL

This Navigation command is not allowed when the Title is a random PGC title. This error is reported for the CallSS Navigation command.

ERR_DVD_XCHECK_CHANNELS_ILL

The number of Audio_channels specified does not correspond with the number of audio_channels found in the VOB. This error is checked at:

- The end of the audio frame header, in case of a mono or stereo MPEG audio stream.
- The end of the multi channel extension header, in case of a multi channel MPEG audio stream.
- The end of the seven channel augmentation data, in case of a 7.1 MPEG-2 audio stream.
- The end of the Private-1 header, in case of Dolby AC-3 and LPCM streams.

The numbers reported in the error message are the real numbers of audio streams, not the value of the number_of_audio_channels field (which is normally 1 less than the actual number of audio channels).

>>> [DVD] ERROR 5704 (ref. DVD-3 4.1.1 BP 260 / 4.2.1 BP 260/516) :
ERR_DVD_XCHECK_DRC_ILL

The Audio attributes specified Quantization_DRC does not correspond with data found in the VOB. This error is generated in these cases:

- The Quantization_DRC equals '1', meaning dynamic range control bits available, but the audio stream does not contain these dynamic range control bits.
- The Quantization_DRC equals '0', meaning dynamic range control bits available, but the audio stream contains these dynamic range control bits.



4.4.22.6 Sub-picture Cross Checks

>>> [DVD] ERROR 5726 (ref. DVD-3 4.3.2-3) :

ERR_DVD_XCHECK_DEC_SPSTN_NOT_FOUND

The Sub-picture stream specified in the PGC (PGC_SPST_CTLT) was not found in this VOB.

At the end of the VOBS, all Sub-picture streams that have the Availability_flag in the PGC_SPST_CTL of the Sub-picture stream set to '1' will be checked against the Sub-picture streams that were present in the VOB. When Sub-picture streams should be available, but were not found, this error is generated.

>>> [DVD] ERROR 5727 (ref. DVD-3 4.3.2-3) :

ERR_DVD_XCHECK_SPSTN_NOT_FOUND

An Sub-picture stream was found in the VOB, but was not specified in the PGC (PGC_SPST_CTLT).

When an Sub-picture packet is encountered in the VOBS, the Availability_flag for that Sub-picture stream should be set to '1' in the PGC_SPST_CTL of the Sub-picture stream. This error is generated when the Availability_flag is set to '0'.

4.4.22.7 VOB Cross Checks

>>> [DVD] ERROR 5751 (ref. DVD-3 4.3.2) :

ERR_DVD_XCHECK_VOBU_SA_NOT_FOUND

The Start Address of the current VOB or VOBU does not correspond with any VOBU-Start Address specified in the VOBU_ADMAP table. Since each VOB starts with a VOBU, the start address of a VOB must be equal to one of the VOBU start addresses in the VOBU_ADMAP for the current VTS.

>>> [DVD] ERROR 5776 (ref. DVD-3 4.3.2-1 (1)) :

ERR_DVD_XCHECK_PGC1_NO_VOB

In a PGC without any VOB, a number of fields should be zero. This error is reported in these cases:

- The Number of Programs value does not equal '0'.
- The Number of Cells value does not equal '0'.
- The PG_playback_mode from the PGC_NV_CTL does not equal '0'.
- The Still_time_value from the PGC_NV_CTL does not equal '0'.

>>> [DVD] ERROR 5777 (ref. DVD-3 4.3.2-1 (2)) :

ERR_DVD_XCHECK_TCFLAG_ILL

The tc_flag does not correspond with the TV_system. The tc_flag indicates the number of frames per second, which is only valid for the correct TV_system. This error is reported when:

- The tc_flag equals 3, but the TV_system for the current VOB is PAL.
- The tc_flag equals 1, but the TV_system for the current VOB is NTSC.

The TV_system is specified in the VTSI field VTSM_V_ATR for VOBUs in a VTS menu VOB and the VTSI field VTS_V_ATR for VOBUs in a VTS title VOB.

>>> [DVD] ERROR 5778 (ref. DVD-3 4.3.2-2/3) :
ERR_DVD_XCHECK_AVAILABLE_STREAMS_ILL

The number of Available Audio or Sub-picture streams is larger than the number specified, which is found in the VTSI:

- **VTSM_AST_Ns** for Audio streams in a VTS menu VOB.
- **VTS_AST_Ns** for Audio streams in a VTS title VOB.
- **VTSM_SPST_Ns** for SP streams in a VTS menu VOB.
- **VTS_SPST_Ns** for SP streams in a VTS title VOB.

This error reports that more Audio or Sub-picture streams were found in the VOB, than specified in the VTSI, where the number of streams is specified. This number gives the number of possible streams, not the actual number. The number of Audio or Sub-picture streams in the VOB may therefore be less than the number specified in the VTSI.

>>> [DVD] ERROR 5779 (ref. DVD-3 4.3.2-3) :
ERR_DVD_XCHECK_DEC_NR_ILL

The decoding sub picture stream number is illegal with the current **Aspect_ratio**. This error is reported if a field of the **PGC_SPST_CTL** should be '0'.

When the **Aspect_ratio** for the current VOB is 4:3, then these fields should be '0':

- **Decoding_sub_picture_stream_for_Wide**.
- **Decoding_sub_picture_stream_for_Letterbox**.
- **Decoding_sub_picture_stream_for_Pan-scan**.

When the **Aspect_ratio** for the current VOB is 16:9, then this fields should be '0':

- **Decoding_sub_picture_stream_for_4:3**.

The **Aspect_ratio** is specified in the VTSI field **VTSM_V_ATR** for VOBUs in a VTS menu VOB and the VTSI field **VTS_V_ATR** for VOBUs in a VTS title VOB.

>>> [DVD] ERROR 5780 (ref. DVD-3 4.3.2-1 (6)) :
ERR_DVD_XCHECK_PGC_NV_CTL_ILL

Fields from the **PGC_NV_CTL** should be '0' in a **One_Sequential_PGC_Title**. This error is reported when:

- The **Next_PGC_number** does not equal '0' in a **One_Sequential_PGC_Title**.
- The **Previous_PGC_number** does not equal '0' in a **One_Sequential_PGC_Title**.
- The **GoUp_PGC_number** does not equal '0' in a **One_Sequential_PGC_Title**.

To determine if a title is a **One_Sequential_PGC_Title**, the field **TT_TY** from the structure **TT_PB_TY** from the VMGI for the current Title should be '0'.



4.4.22.8 TMAP Cross Checks

>>> [DVD] ERROR 5801 (ref. DVD-3 4.2.5-3) :

ERR_DVD_XCHECK_TMAP_ENTRY_ILL

The MAP_ENA should describe the start address of the VOBU, where the presentation time corresponding to the MAP_EN is included, with RLBN from the first LB of the VTSTT_VOBS in the VTS.

Determination of the correctness of the MAP_ENA is done by calculating the time elapsed since the start of the PGC:

Total_Previous_Cell_time - cell_start_time + VOBU_E_PTM (ticks)

The value is compared to the calculated elapsed time for the current MAP_EN:

MAP_EN * TMU * 90000 (ticks)

When the elapsed time in the PGC exceeds the elapsed time for the MAP_EN, the start address of the current VOBU is compared to the MAP_ENA value, which should be identical. Also, the verifier is set to check the next MAP_EN.

>>> [DVD] ERROR 5802 (ref. DVD-3 4.2.5-3 (3)) :

ERR_DVD_XCHECK_TMAP_1ST_ANGLE_ONLY

The MAP_ENT should only describe MAP_ENAs for the first angle, skipping MAP_ENAs until current VOBU start address.

This error reports that the TMAP table in the VTSI specifies MAP_ENs for each angle in the angle block. According the [DVD] 4.2.5-3 (3) spec, only MAP_ENAs are allowed for angle 1. The remaining MAP_ENAs are skipped. This error is detected when the a MAP_ENA is smaller than the previous MAP_ENA.

>>> [DVD] ERROR 5803 (ref. DVD-3 4.2.5-3 (3)) :

ERR_DVD_XCHECK_TMAP_SKIPPED

The MAP_ENA cannot be used, because the stream is already past this position (current VOBU start address). Skipping MAP_ENAs until current VOBU start address.

This error could also be a result of 5802, but can also indicate a problem in the TMAP table. A MAP_ENA was specified that didn't belong in the table, because the current VOBU address should be used, according the calculations.

4.4.22.9 Cell Attribute Cross Checks

>>> [DVD] ERROR 5826 (ref. DVD-3 4.3.5-1) :

ERR_DVD_XCHECK_CELL_ADDRESS

A field specifying an address from the PGCI.C_PBI does not correspond with data from the VOB. This error is reported when:

- The C_FILVU_EA does not correspond with the end address of the first ILVU in the Cell.
- The C_LVOBU_SA does not correspond with the start address of the last VOBU in the Cell.
- The C_LVOBU_EA does not correspond with the end address of the last VOBU in the Cell.

These errors are checked at the end of each Cell. The C_FVOBU_SA is not checked here, because this address equals the Cell start address and is checked in 0

>>> [DVD] ERROR 5827 (ref. DVD-3 4.3.5) :

ERR_DVD_XCHECK_CELL_SA_NOT_FOUND

The Start Address of the current Cell does not correspond with the Start Address of the first VOBU in the Cell. This is checked at the start of a Cell. The start address of the Cell should be equal to the C_F_VOBU_SA in the PGCI.C_PBI, because each Cell starts with a VOBU.

>>> [DVD] ERROR 5828 (ref. DVD-3 4.3.5-1 (1)) :

ERR_DVD_XCHECK_CELL_BLOCK_MODE

The Cell_Block_mode of the Cell data in the PGCI does not correspond to the block mode of the current Cell. This error is reported when:

- The Cell_Block_mode equals '00b' (not a cell in a block), but the current Cell is found in an angle block. This is checked at the start of each Cell.
- The Cell_Block_mode does not equal '01b' (the first cell in a block) and the current Cell is found as the first Cell in an angle block. This is checked at the start of each Cell.
- The Cell_Block_mode does not equal '10b' (a cell in a block), but the current Cell is found in an angle block and is not the first or the last Cell in the angle block. This is checked at the start of each Cell.
- The Cell_Block_mode does not equal '11b' (the last cell in a block), but the previous Cell was found to be the last Cell in an angle block. This is checked at the end of each the interleaved block.

The Cell_Block_mode is specified in the PGCI.C_PBIT.CPBI.C_CAT.

>>> [DVD] ERROR 5829 (ref. DVD-3 4.3.5-1 (1)) :

ERR_DVD_XCHECK_CELL_BLOCK_TYPE

The Cell_Block_type of the Cell data in the PGCI does not correspond to the block type of the current Cell. This error is reported when:

- The Cell_Block_type equals '00b' (not part of a block), but the current Cell is found in an angle block.
- The Cell_Block_type equals '01b' (part of an angle block), but the current Cell is not found in an angle block.

These errors are checked at the start of each Cell. The Cell_Block_type is specified in the PGCI.C_PBIT.CPBI.C_CAT.

>>> [DVD] ERROR 5830 (ref. DVD-3 4.3.5-1 (1)) :

ERR_DVD_XCHECK_CELL_INTERLEAVED

The Interleaved_allocation_flag from the PGCI.C_PBIT.CPBI.C_CAT should correspond to the ILVU_flag from the DSI.SML_PBI.VOBU_SMLCAT

>>> [DVD] ERROR 5831 (ref. DVD-3 4.3.5-1 (1)) :

ERR_DVD_XCHECK_CELL_SEAMLS

The Seamless_playback_flag and the STC_discontinuity_flag specify an illegal value, for the current Cell. This error is reported when the Seamless_playback_flag and the STC_discontinuity_flag do not comply to this table:

<i>Previous Cell</i>	<i>Current Cell</i>	<i>Seamless playback flag</i>	<i>STC discontinuity flag</i>
Cell in angle block	Single	1	1
Single Cell	Cell in angle block	1	1
No Cell		0	1
Cell in angle block	Cell in angle block	1	0

This is checked at the start of each Cell.



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>>> [DVD] ERROR 5832 (ref. DVD-3 4.3.5-1 (1)) :

ERR_DVD_XCHECK_CELL_STILL

Cell_still_time in previous cell should be ‘0’ (no still), because it is the last cell of the program and the still time of the PGC of that program is not ‘0’.

>>> [DVD] ERROR 5833 (ref. DVD-3 4.3.5-1 (1)) :

ERR_DVD_XCHECK_CELL_CMDNUM

Cell_command_number is not present in any cell command of PGC. This error is reported when the **Cell_command_number** from the Cell is larger than the number specified in the PGC.PGC_CMDTI.C_CMD_Ns (cf. [DVD-3] 4.3.3-1).

>>> [DVD] ERROR 5834 (ref. DVD-3 4.3.5-1 (2)) :

ERR_DVD_XCHECK_CELL_PBTM_ILL

The C_PBTM of the current Cell should be equal to the C_ELTM of the last VOBU of the Cell increased with the duration of that VOBU.

4.4.22.10 GOP Cross Checks

>>> [DVD] ERROR 5876 (ref. DVD-3 4.2.5) :

ERR_DVD_XCHECK_FRAMERATE_ILL

The specified frame_rate does not correspond with the TV_system for this VOB. This error is reported when:

- The frame_rate equals ‘00b’ and the TV_system equals ‘00b’ (PAL).
- The frame_rate equals ‘10b’ and the TV_system equals ‘10b’ (NTSC).

>>> [DVD] ERROR 5877 (ref. DVD-3 4.2.5-3) :

ERR_DVD_XCHECK_LINE21DATA_ILL

Line21 user_data available in GOP for a field, while the corresponding line21_switch was not set in the VTSI. This error is reported when:

- Line21 user_data is available in the GOP for a top field, but the line21_switch_1 equals ‘0’.
- Line21 user_data is available in the GOP for a bottom field, but the line21_switch_2 equals ‘0’.

The line21_switch_1 and line21_switch_2 can be found in the VTSI_MAT.VTSM_V_ATR for a menu VOB and VTSI_MAT.VTS_V_ATR for a title VOB (cf. [DVD-3] 4.2.1-1).

4.4.22.11 Angle Cross Checks

>>> [DVD] ERROR 5901 (ref. DVD-3 4.2.5-3) :

ERR_DVD_XCHECK_ANGLE_ILL

The Number of Angles in the current ILVB does not correspond to the AGL_Ns in the title. The AGL_Ns is found in the VMGI.TT_SRPT.TT_SRP (cf. [DVD-3] 4.1.2-2) with the current VTSN and VTS_TTN.

4.4.22.12 File System Cross Checks

Both file systems, which are placed on a DVD disc, describe a tree of directories and files. The entire path and identifier of a file is used as a key. Both file systems describe attributes of files. These attributes can be compared. When these descriptions are not consistent, an error message must be generated. To perform this verification, the xcheck structure is used, see [xcheck].

The following strategy is used to perform this verification. The verification can be divided into the following stages.

1. When a File Identifier and a File Entry (ECMA/UDF file system) have been parsed, two events are generated by the parser. First, the event EVT_FID_FE_PATH is generated. This event is accompanied by a reference to entire path of the file described by the FID and FE for which an event is generated directly after this event. The path is stored in the cross check structure and can be used in the future. Second, the event EVT_FID_FE is generated when a FID and its corresponding FE have been parsed. Using these three structures (the path name, the FID and the FE) a structure is created to store this information about a single file in the cross check object.
2. When a Directory Record (ISO file system) has been parsed, the event EVT_DR_PATH is generated. This event is accompanied by a DR and the path of the file which is described by the DR. This information is also stored in the xcheck structure.
3. When the entire file system has been parsed, the event EVT_FS_PARSED is generated. The information gathered from parsing both file systems is stored in the xcheck file.
4. When the cross check needs to be performed, the information about the files (found in both file systems) is restored from file and the verification is performed. The entire path of a file is used as a key. For every file in either one of the file systems the corresponding file information is examined. If there is no corresponding description in the other file system, an error is generated. Furthermore, when the corresponding file information is not consistent, an error message is generated.

The error messages which can be detected when the cross checks are performed, are presented in this section.

>>> [DVD] ODDITY 5951:

ERR_FS_XCHECK_LOCATION

When both file systems describe the same file, the locations of the file described by both file systems must be the equal.

>>> [DVD] ODDITY 5952:

ERR_FS_XCHECK_SIZE

When both file systems describe the same file, the size of the file described by both file system must be the equal.

>>> [DVD] ODDITY 5953:

ERR_FS_XCHECK_FVN

When both file systems describe the same file, the value of the attribute File Version Number described by both file system must be equal.

>>> [DVD] ODDITY 5954:

ERR_FS_XCHECK_DIRECTORY_FLAG

When both file systems describe the same file, the value of the attribute Directory Flag described by both file systems must be equal.

>>> [DVD] ODDITY 5955:

ERR_FS_XCHECK_EXISTENCE_FLAG

When both file systems describe the same file, the value of the attribute Existence Flag described by both file systems must be equal.



PHILIPS

>>> [DVD] ODDITY 5956:
ERR_FS_XCHECK_CGMS

When both file systems describe the same file, the value of the attribute Copyright Generation Management System described by both file systems must be equal.

>>> [DVD] ODDITY 5957:
ERR_FS_XCHECK_CM

When both file systems describe the same file, the value of the attribute Copyrighted Material described by both file systems must be equal.

>>> [DVD] ODDITY 5958:
ERR_FS_XCHECK_PST

When both file systems describe the same file, the value of the attribute Protection System Type described by both file systems must be equal.

>>> [DVD] ODDITY 5959:
ERR_FS_XCHECK_FILE_NOT_FOUND

When either the [ISO] or the [ECMA]/[UDF] file system describes a file, the other file system must also describe that file.

Appendix A. Bugs, Shortcomings & Limitations

The bugs listed below will be solved in the near future. For the listed shortcomings and limitations there are no plans yet to do anything about them.

1.1 Known Bugs

1. MPEG-2 Audio: In case of 7.1 channel audio, CRC errors could be reported in the 7 channel augmentation data. This only happens when the CRC error check is split up over the base frame and the corresponding extension frame. To check whether CRC errors in 7 channel augmentation data are authentic, dump the audio content and check for a split-up aug_crc_check field.

1.2 Shortcomings

1. The tool can not handle directory or file names containing spaces!
Tip: replace spaces in the directory or file name with underscores.
2. Verification start location can be specified in units not matching the input stream type and matching unsupported input stream types (non IFO or VOB files, i.c. PES or ES).
3. Apart from a hint for some buttons or fields, the GUI lacks any kind of Help facility.
4. When verifying a DVD disc or disc image, the tool uses the same log file for the backup versions of the navigation (.BUP) files as well as for the original (.IFO) files.
5. Miscellaneous line width setting not (yet) active.
6. If the verifier is started from the command prompt with parameters in a console, then a new console window is opened to display the stdout messages.

1.3 Limitations

1. No generic ES or Private-stream input is supported.
2. ~~AC-3 parsing & verification has been disabled due to license fees to Dolby corp.~~
3. CSS encrypted discs (most commercial DVD discs) cannot be verified fully.
The .VOB files are encrypted and therefore cannot be verified, the other files not. It is however still possible to verify the file systems ISO9660 and UDF, further the .IFO and .BUP files can be verified without problems.

1.4 Deficiencies

1. A ‘delayed verification start’, i.e. when verification is not started right from the start of a file but at a specified pack number, may cause the verifier to crash. This is due to the inability to sync the audio data properly. Try to start verification at an earlier or later pack/packet/byte. If one is not interested in audio checks, one could skip the audio data completely.
2. If the verifier input data have extreme deviations with respect to the supported standards, a possible crash during the parsing phase might occur. In that case our advise is to fix the already reported errors first and then try again, since the crash is likely to be a direct result of these earlier errors.



1.5 Features Not Yet (Sufficiently) Tested

Here, all the features that were insufficiently - or not at all - tested, are listed. If something is not tested, this is usually the result of test data being not sufficiently or not at all available.

1. Parental Control aspects.